the OIL AND GAS JOURNAL

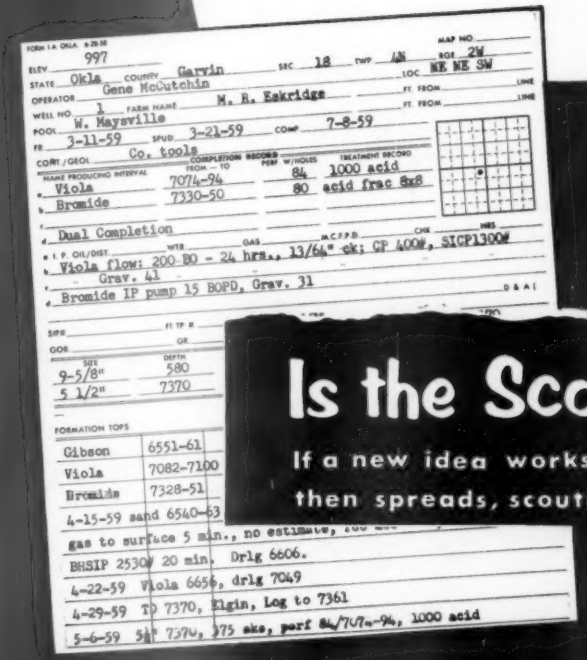
PUBLISHED WEEKLY AUGUST 3, 1959

Where oil stands today in Congress p. 39

The job outlook for geophysicists p. 48

Saudi Arabia's gas offered for sale p. 61

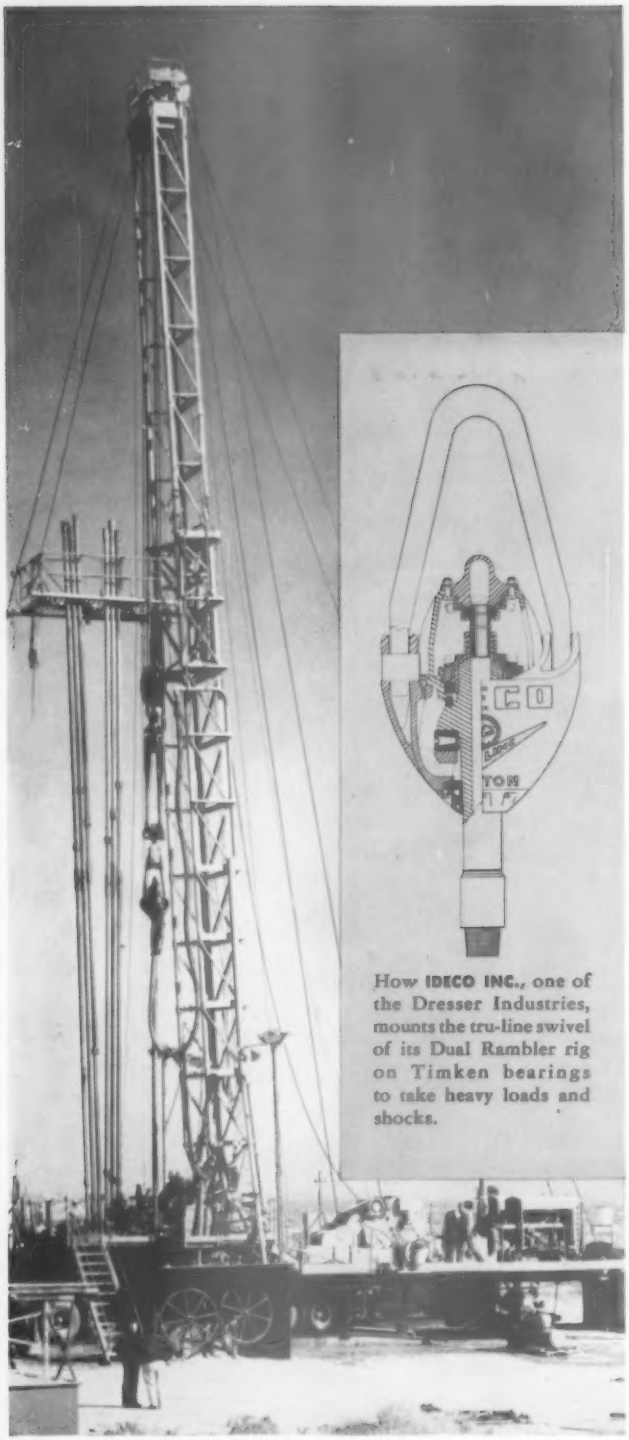
Lessons learned from the CATC fire p. 94



ELEV 997 MAP NO.
STATE Okla COUNTY Garvin SEC 18 TWP 4N RGE 2W
OPERATOR Gene McCutchin LOC NE NE SW
WELL NO 1 FARM NAME M. R. Eskridge FT. FROM LINE
POOL W. Maysville FT. FROM LINE
FD 3-11-59 SPUD 3-21-59 COMP 7-8-59
CONT / GEOL Co. tools
COMPLETION RECORD — NAME PRODUCING INTERVAL — FROM — TO — PERF W/HOLES — TREATMENT RECORD
a. Viola 7074-94 84 1000 acid
b. Bromide 7330-50 80 acid frac 6x8
c.
d. Dual Completion
e. I. P. OIL/DIST. WTR GAS MCF/D CHK MEG
b. Viola flow: 200 BO - 24 hrs., 13/64" ck; CP 400#, SICP1300#
Grav. 41
d. Bromide IP pump 15 BOPD, Grav. 31
D & A [illegible]
SPD FT TP R
GOR GR
SIZE DEPTH
9-5/8" 580
5 1/2" 7370
FORMATION TOPS
Gibson 6551-61
Viola 7082-7100
Bromide 7328-51
4-15-59 sand 6540-63
gas to surface 5 min., no estimate, [illegible]
BHSIP 2530# 20 min. Drlg 6606.
4-22-59 Viola 6656, drlg 7049
4-29-59 TD 7370, Elgin, Log to 7361
5-6-59 5½" 7374, 375 sks, perf 84/7074-94, 1000 acid

Is the Scout Check Obsolete?

If a new idea works in the Rockies and then spreads, scouting won't be the same p.44



How **IDECO INC.**, one of the Dresser Industries, mounts the tru-line swivel of its Dual Rambler rig on Timken bearings to take heavy loads and shocks.

SETS UP FAST... fast on the job with Timken® bearings to eliminate breakdowns

IDECO'S Rambler Rigs combine the advantages of modern heavy-duty equipment with high mobility to provide faster, more economical operations. And to insure continuous, high speed operation under heavy loads and dirty operating conditions, Ideco specified Timken® tapered roller bearings at four critical load-carrying points—swivel, crown block, traveling block and rotary table.

Tapered construction lets Timken bearings take radial and thrust loads in all combinations. And with full line contact between Timken bearing rollers and races you get *extra* load-carrying capacity. By keeping shafts concentric with housings, Timken bearings make closures more effective in keeping lubricant in, keeping dirt and dust out.

And Timken bearings practically eliminate friction—reduce wear on related parts, prolong life. They're geometrically designed to give *true rolling motion,* precision-made to do just that in actual daily service. We even make our own steel—something no other American bearing maker does.

Insist on Timken bearing quality, as Ideco has done for years. When you build or buy machinery for the petroleum industry, look for the trade-mark "TIMKEN" on every bearing. It's your symbol of Better-ness. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".

This symbol on a product means its bearings are the best.

WHEN YOU BUY TIMKEN® BEARINGS YOU GET...

1. Quality you can take for granted
2. Service you can't get anywhere else
3. The best-known name in bearings
4. Pace setter in lower bearing costs

BETTER-NESS rolls on

TIMKEN®

tapered roller bearings

First in bearings for 60 years

OIL AND GAS JOURNAL
Vol. 57 No. 32

Contents August 3, 1959

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TECHNOLOGY—OPERATION

Refining-Processing

Computer Control of Internal Reflux in Fractionators 68
By D. E. Lupfer and D. E. Berger
The internal-reflux computer-control system has been successfully applied to a number of fractionators at a cost substantially less than would be required for good reflux temperature control. Reduction in reboiling steam consumption and more uniform composition of products are other advantages.

Refinery Cost Indexes 98
The Journal's refinery-construction index and refinery-operating-cost index.

The Alkazid Process for Removing H_2S and CO_2 From Gas 100
By R. Leuhddemann, G. Noddes, and H. Schwarz
Concentrated aqueous solutions of amino acids are used to remove hydrogen sulfide or carbon dioxide selectively or simultaneously from industrial gases. The corrosion problem is overcome by using aluminum instead of stainless steel in reboilers, exchangers, and other places especially subject to attack.

Process Costimating—53 109
Operating costs of gas-recovery plants utilizing gas from various refinery units

Pipelining

Dual-Beam Microwave System Gives 99.932% Reliability 89
By G. V. Morck
This system has been used on Sinclair's Marion, Ohio, to East Pittsburgh, Pa., pipeline since September 1956. Outage has averaged only 6 hours and 5 minutes per year. This system is actually two separate microwave systems operating on a single microwave frequency. This mode of operation is comparatively simple to understand and maintain.

Rubber Balls Clear Water From Line 112
By Leon Brooks
They were used on tests of several hundred miles of Houston Gas & Oil Corp.'s lines in Florida. Advantages of use included reduced compressed air requirements, large reduction in the formation of air locks, and extremely tight seals.

Production

Sonic Log Applications in West Texas and New Mexico 73
By Max E. Curry
The acoustical log is a most important contribution to logging techniques. It is possible to run and record simultaneously curves for two or more spacings. And considerable advancement may be expected soon by better instrumentation, better interpretation techniques, and in the presentation of recording curves.

The CATC Fire—How It Happened and What Followed 94
Here are excerpts from the official United States Coast Guard report on this oil disaster. The account includes the cause of the fire, what followed it, and what the consequences to offshore operators likely will be.

Drilling

Diatomaceous Earth Cures Lost Circulation in Cementing Casing .. 78
By A. J. Willis and R. A. Wynne
Strength requirements for cements in casing jobs have been revised downward in the drilling industry lately. As a result lightweight slurries have become acceptable and are proving helpful in maintaining circulation while casing is being cemented. These slurries frequently make possible cementing casing in a single stage instead of in two or more.

Folding Catwalk Expedites Use of Swab Line 84

The CATC Fire—How It Happened and What Followed 94

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
August 3, 1959

Same issue is behind all four refinery strikes:

Walkouts will determine whether management or unions will say how many people are employed and what work they will perform.

Indiana Standard management says its representatives will resume bargaining at any time the striking unions are ready to be realistic. The company won't capitulate to impossible demands (p. 43).

For the industry the four strikes mean:

...Nearly 7,300 men out of work with a payroll loss running almost a million dollars a week.

...Refining capacity of 496,000 bbl. daily shut in. This is about 5.5% of industry capacity.

...Disturbed markets. Indiana will cut back its crude buying in 14 states. It will buy gasoline from other refiners to fill customers' needs. Result may be softer crude markets in midcontinent and Gulf Coast, tighter gasoline markets.

▼ ▼ ▼

Hurricane Debra luckily missed the main oil area.

Only minor damage offshore and in bays along the Gulf Coast resulted.

A Brewster-Bartle Drilling barge overturned at Galveston. Winds and waves damaged well structures, tanks, boats, and barges in bays along the coast. Equipment at two wells being drilled for Standard of Texas and Texaco was in path of the storm but rode it out.

▼ ▼ ▼

Keep an eye on Congress as the rush to adjourn gets started. Stacks of bills affecting the oil industry are hanging around.

A gasoline tax increase tentatively has been voted down in committee. But it could rise again.

So far this session the oil industry has been the subject of very few new laws. It has been subject of verbal blasts on depletion, foreign operations, marketing practices, alleged pipeline rebates, etc. These have come from some congressmen representing the minority view.

Most of the bills actually introduced are likely to be held over until next session (p. 39).

▼ ▼ ▼

Total capital invested in oil during 1958 was $5.3 billion, according to Chase Manhattan Bank study.

It reflects a tight year because the 1953-57 average capital expenditure is $5.7 billion per year.

Production facilities again took the most money—$3,650 million or 68.9% of the total.

Returns were: 8.7% on borrowed and invested capital, 9.5% on invested capital; and 6.9% on total assets.

Data on taxes are interesting. Industry charged total of $1,633 million in taxes against earnings and collected $3,970 million more in consumer levies on oil products for governmental agencies.

Importers brought in less oil than they were allowed during first quota period of the mandatory-control program.

The balance sheet: Imports 1,441,509 bbl. daily. Allowables 1,472,344 bbl. daily. Underage 30,835 bbl. daily.

Allocation for next period is 1,450,000 bbl. daily.

▼ ▼ ▼

The scout check may be on the way out.

Trend may be established in the Rockies where seven oil companies have agreed to pay a commercial organization $30,000 a year each to supply them a scouting report.

If this undertaking succeeds, pressure will increase for giving a new look to scouting practices in other parts of the country (p. 44).

Drop in exploration activity has cost many jobs for geophysicists just as it has for geologists.

There's one big difference: Spurt in foreign work has taken up the slack for geophysicists more than it has for their colleagues in other exploratory professions.

This foreign work is likely to continue for some time because of terms of concession agreements. Domestic work, however, is likely to continue slumping.

That's the opinion of Dr. B. B. Weatherby, respected geophysicist and oil company executive who analyzes the trends on p. 48.

▼ ▼ ▼

Interesting discovery in North Louisiana already has five pay zones and is still drilling to its objective.

Well is Arkansas Louisiana Gas' 1 Kennedy. It first made news by flowing 2,800 M.c.f. daily on ¼-in. choke with 1,910-psi. pressure from the Causey-Basal Trinity sand at 5,678-87 ft.

On a later series of drill-stem tests, four gas pay zones were found in the Hosston formation at intervals from 6,130 to 8,500 ft. Target is 10,300 ft. to test the lower Cotton Valley-Jurassic section (p. 129).

Alaska notes: Fourth Swanson River wildcat is rated at 100 bbl. daily. California Standard now plans to move rig to a fifth location one-half mile east, which puts it on a straight line between first and second wells...General Petroleum is drilling around 4,000 ft. at its 1 Great Basins... Union-Ohio's 1 Kenai Unit is drilling ahead at about 11,000 ft....Anchorage Oil & Gas is waiting on special fishing tools at its 3 Rosetta...Navy is making its cuttings and core samples from exploration in Petroleum Reserve No. 4 available for study by companies interested in northern Alaska.

▼ ▼ ▼

Swan Hills was the hot spot in Alberta's crown sale.

Total bonus bids were $19.8 million, slightly less than the $20-million sale in April.

Pan American and British American jointly bought eight of the 10 Swan Hills tracts offered. Highest bid was $4,222 an acre for a 320-acre parcel, making the price tag exceed $1.35 million.

Canada's Swan Hills boom will get into movies.

The National Film Board will make a 20-minute film of the oil development in the remote Alberta hills. Shooting crew will move into the field later this month.

Aim of the film: Show the people who are opening up inaccessible country—engineers, roughnecks, cat skinners, geologists, truck drivers, bush pilots, etc.

More human interest will be provided by studies of the makeshift cafes and stores and by a look at the pioneer families soon to move into a new model town.

Movie will be released to public in March 1960. It will be available abroad through embassies and legations in a number of language versions.

▼ ▼ ▼

Official crankcase oil-change recommendation of the API marketing division:

In winter every 30 days, in summer every 60 days, but never to exceed 2,000 miles.

The new policy was approved by the marketing division general committee (OGJ, June 1, p. 107) and is now in effect.

Refiners are continuing to upgrade regular gasoline.

Average quality of regular in U. S. moved up another tenth of an octane in July, according to Ethyl's monthly nationwide survey.

It's the fifth such gain in 7 months for regular. Since January, regular quality has gone up half a number while premium has been improved by only one tenth.

Improvement in regular is laid to inability of much of the fuel to satisfy requirements of Detroit-labeled economy cars.

Humble is moving into the Arizona market fast.

It now has 89 Humble-brand service stations in its new marketing territory and has taken over 42 other independent stations using the new "Arizona" brand.

Quick expansion was possible by deal with Western Petroleum of Flagstaff and purchase of Suaharo and Five Star earlier.

▼ ▼ ▼

Program to prevent misuse of plastic bags is being pushed by Society of Plastics Industry in wake of several child suffocation cases.

Small children are fascinated by the polyethylene film and suffocate when they become enmeshed in the shiny covering. Plastics men claim the film is excellent for its intended uses. It's not a play thing, should be destroyed when this purpose is served, and not reused around the house.

At stake is a sizable market for polyethylene if public antipathy should mount against the film.

▼ ▼ ▼

Another Canadian firm is interested in building a crude pipeline from northeastern British Columbia to tide water on the West Coast.

It only awaits development of production and markets to justify the investment.

Gibson Associated Oils, one of four firms seeking a permit to build a line from Milligan Creek to Dawson Creek refineries, also proposes a line to tide water or to a carrier with a coastal outlet.

Such a line will be needed in a year and half, the company believes.

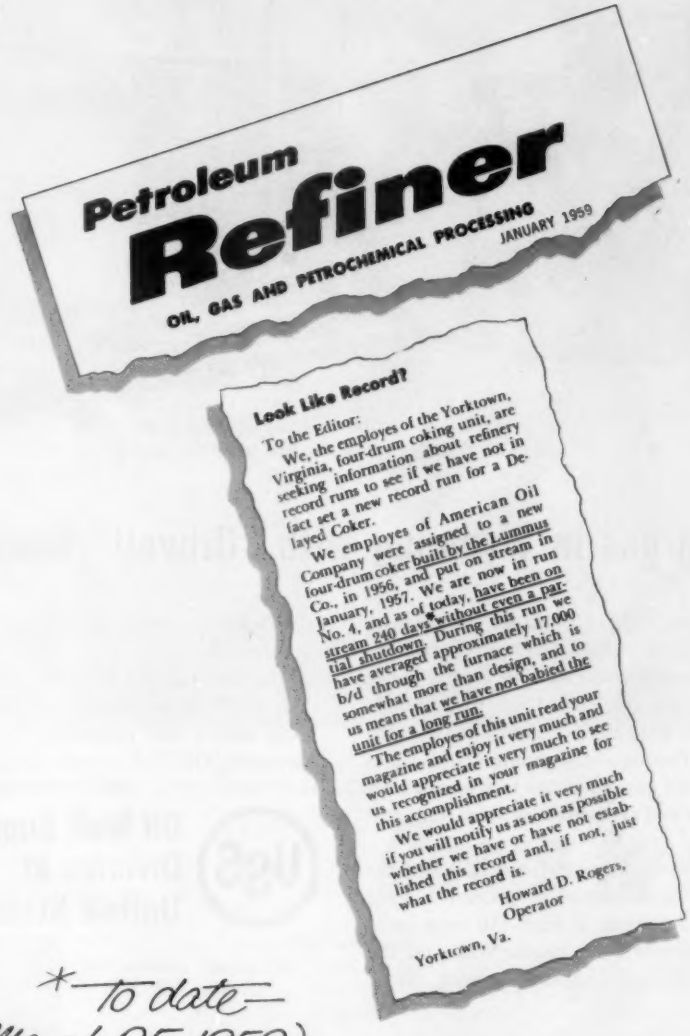
▼ ▼ ▼

Developments abroad:

...Superior finally got a dry hole in its Maracaibo concession. The company drilled 23 producers—some in the 10,000-bbl.-daily class—on the 7,774-acre lake block for which it paid $22 million. The 24th was dry.

...Companies in Argentina are getting off to a good start on contracts despite political storm clouds.

...Aramco is making a special drive to lure industry to Saudi Arabia. The bait is natural gas at a low price.



Petroleum Refiner

OIL, GAS AND PETROCHEMICAL PROCESSING

JANUARY 1959

Look Like Record?

To the Editor:

We, the employes of the Yorktown, Virginia, four-drum coking unit, are seeking information about refinery record runs to see if we have not in fact set a new record run for a Delayed Coker.

We employes of American Oil Company were assigned to a new four-drum coker built by the Lummus Co., in 1956, and put on stream in January, 1957. We are now in run No. 4, and as of today, have been on stream 240 days* without even a partial shutdown. During this run we have averaged approximately 17,000 b/d through the furnace which is somewhat more than design, and to us means that we have not babied the unit for a long run.

The employes of this unit read your magazine and enjoy it very much and would appreciate it very much to see us recognized in your magazine for this accomplishment.

We would appreciate it very much if you will notify us as soon as possible whether we have or have not established this record and, if not, just what the record is.

Howard D. Rogers,
Operator

Yorktown, Va.

*—to date—
(March 25, 1959)
their record now stands at 354 days..

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Mr. G. H. "Ike" Fletcher, Production Superintendent for Belco Petroleum Corporation, shows the DGE-250, the largest on the job.

Pumping gas in Wyoming with "Oilwell" Compressors

At Big Piney, Wyoming, Belco Petroleum Corporation has five "Oilwell" Compressors pumping gas from twenty-seven wells to a main compressor station twenty miles away. At 7,400 feet above sea level, these installations are unprotected and the units operate continuously with minimum supervision. During winter months, when these pictures were taken, they are subjected to temperatures 30° or more below zero and are pelted by snow, hail and high winds.

"Oilwell" Gas Compressors are designed in sizes from 25 to 300 hp and can be furnished to perform a wide range of gas-handling functions at high altitudes or at sea level. The excellence of their engineering and the high quality of their various components assure you of dependable performance—even under adverse weather conditions.

For natural gas pumping operations, contact your "Oilwell" representative for information as well as technical advice and assistance, or write Compressor Department, Oil Well Supply, Dallas 21, Texas.

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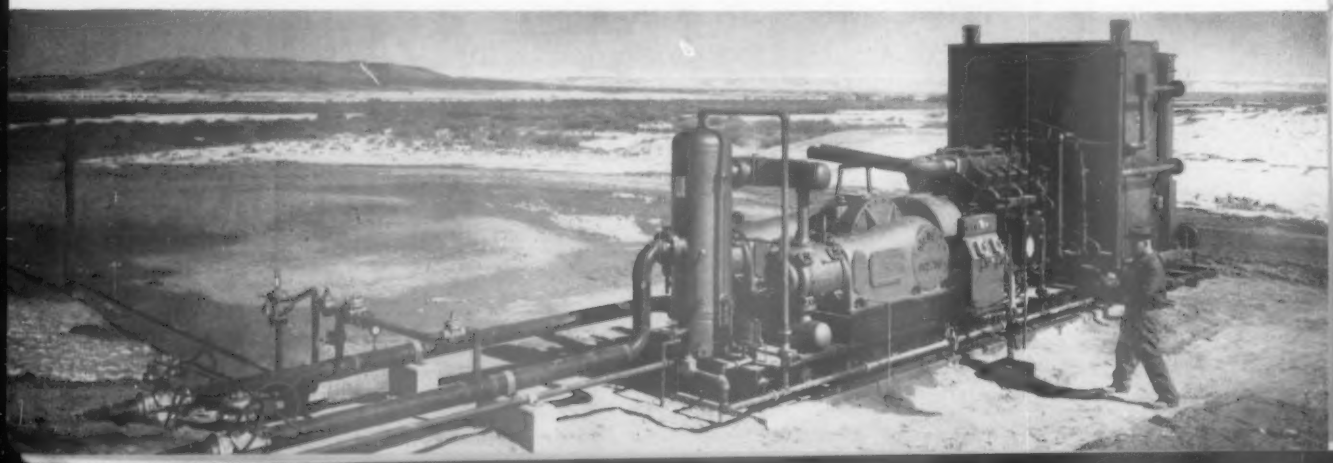
Executive Offices—Dallas, Texas
Export Office—30 Rockefeller Plaza, New York 20, N. Y



For tested generator performance . . .

Come to Kemp

At Gulf Oil's Port Arthur, Texas refinery, purging inerts are supplied by Kemp Generator and Kemp Dryer working as a team. The units produce 30,000 SCFH for a bountiful and easily controlled supply at low cost.

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At the heart of every Kemp Generator is the Kemp Industrial Carburetor, uncomplicated in concept, yet outstanding in performance. It provides sensitive and accurate control of inert analysis. A quick setting of the calibrated dial insures delivery of an unvarying mixture, regardless of line demands.

And Kemp design—rugged, simple, and sturdy—means that maintenance and attendance requirements are kept to a bare minimum. Kemp Inert Gas Generators stand up under the toughest conditions, yet produce with complete dependability.

Your Kemp Representative is listed in *Chemical Engineering Catalog*. Give him a call for more information, or write direct for Bulletin I-10. THE C. M. KEMP MFG. CO., 405 East Oliver St., Baltimore 2, Md.

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Proof of performance is measured by the successes of the past, and, in actual field use, Halliburton pressure isolation tools have an enviable record of Consistent Dependability ...on such assignments as:

- *Locating and repairing leaks in casing*
- *Fracturing and acidizing to improve production*
- *Squeeze cementing*
- *Plugging to abandon depleted zone*

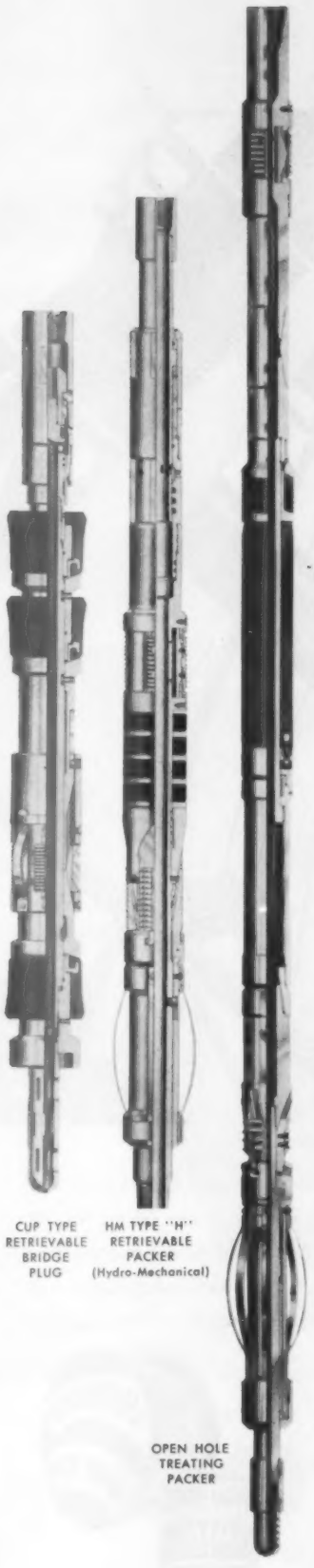
In the above Halliburton Experimental Well actual field problems are studied. The test cell shown on left provides extreme testing conditions—temperatures and pressures a mile deeper than today's wells—for all downhole tools.

Over three decades of experience in practical field application and an unmatched record of continuous research incorporate one vital ingredient in all Halliburton tools: greater benefits for Halliburton customers. This union of experience and research—for consistent dependability—becomes part of your job ...when you specify Halliburton.

HALLIBURTON
OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

Wider Selection of Packers permits greater flexibility of operations

Varying conditions demand packers with different capabilities and features. The wide selection of packers and auxiliary tools available from Halliburton Special Tools Service makes it possible for you to select the one best suited for your specific needs. Four outstanding Halliburton packers are—



CUP TYPE RETRIEVABLE BRIDGE PLUG

HM TYPE "H" RETRIEVABLE PACKER (Hydro-Mechanical)

OPEN HOLE TREATING PACKER

OPEN HOLE DRILLABLE SQUEEZE PACKER

CUP TYPE RETRIEVABLE BRIDGE PLUG

Designed to hold pressure from above or below in a cased hole, providing a positive but easily removable plug. Equipped with cup type sealing elements which are self-sealing with application of pressure differential and double-acting hook wall type slips with a dual wedge arrangement for positive anchoring against pressure from either direction. Tool may be run in alone on tubing where a temporary plug is needed for treating through casing or for holding pressure for surface workover operations. Especially adapted to run below a Halliburton "RTTS" Packer to isolate one or more zones for treating, testing or cement squeezing operations.

HM (Hydro-Mechanical) Type "H" RETRIEVABLE PACKER

A full-opening, heavy duty, hook wall type packer designed to be run on tubing into a cased hole to provide a seal above a section to be fractured, acidized or tested. The full opening I.D. permits pumping a large volume of fluid through the tool with a minimum pressure drop.

OPEN HOLE TREATING PACKER

Designed especially for open-hole conditions to pinpoint and then treat lost circulation zones. Has sufficient over-travel to compensate for normal deviations from drilled hole-size. Can be set and re-set as often as necessary with *only one trip into the hole.*

OPEN HOLE DRILLABLE SQUEEZE PACKER

Used extensively in hard open hole formations near to true bit size. Has been set at depths of 11,000 ft. and held pressures up to 5,000 psi. Identical to Halliburton "DM"-"DC" Drillable Squeeze Packer with the addition of an extension mandrel and a long rubber seal element. Setting procedure is the same as regular squeeze packer and bridge plug. Can be run only on tubing or drill pipe.

SPECIAL TOOLS SERVICES

"CONTINUE TO LOOK TO HALLIBURTON—FOR LEADERSHIP"

Working the State Delacroix No. 38. Here's a view of the 142-ft portable mast atop a Crown Rigs, Inc. barge in the busy Delacroix Island Field in Plaquemines Parish, La. The well, the State Delacroix Island No. 38, was drilled for Texaco Inc. At the time of the photograph, with the drilled depth at 9730 ft, the operator was beginning to set the 7-in. casing. The rugged Bethlehem rotary line was a 1⅛ in. 6 x 19, with independent wire rope core. In superb condition, because of its toughness and durability, it showed a potential of thousands of ton-miles in additional drilling applications planned in the area.

Bethlehem Steel Company, Bethlehem, Pa. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem Wire Rope

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BETHLEHEM WIRE ROPE
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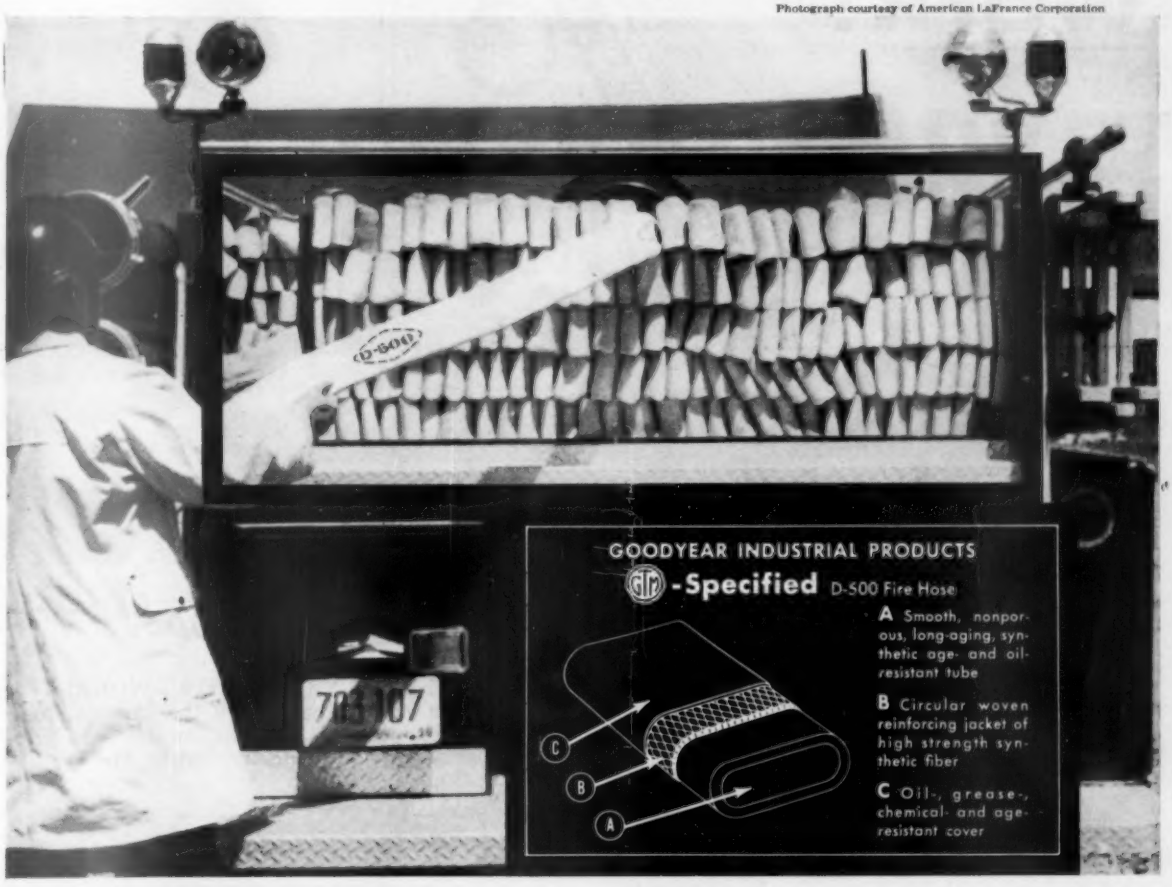
Photograph courtesy of American LaFrance Corporation


D-500
GOODYEAR INDUSTRIAL PRODUCTS
GTM-Specified D-500 Fire Hose
A Smooth, nonporous, long-aging, synthetic age- and oil-resistant tube
B Circular woven reinforcing jacket of high strength synthetic fiber
C Oil-, grease-, chemical- and age-resistant cover
C
B
A

INDUSTRIAL FIRE HOSE BY

GOODYEAR

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Watch a BUCYRUS-ERIE transit crane at work!

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To make the right choice, *see* what these versatile machines can do. You'll see features in action that make Bucyrus-Erie Transit Cranes the best precision load handlers in the business.

As standard equipment, Bucyrus-Erie Transit Cranes offer you independent *power-controlled* lowering boom hoist for maneuvering the boom safely around machinery and pipe.

When you're working in a tight spot, setting up, you'll appreciate the friction swing brake that lets the operator hold both machine and load in the *exact* position you want, anywhere around the circle. There's no juggling for the next gear tooth . . . no jockeying of the swingers to hold steady.

You'll see many more features that make sense where safety and precision are concerned . . . where money and time savings are important.

WATCH A BUCYRUS-ERIE AT WORK! Your distributor will gladly arrange the demonstration at your convenience. See him for full details, or write Bucyrus-Erie Company, South Milwaukee, Wisconsin, Dept. 34E.

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METAL CHLORIDES

Chlorides of Aluminum, Antimony, Boron, Columbium, Silicon, Tantalum, Titanium and Zirconium in commercial quantities; chlorides of Chromium, Germanium, Tin and Vanadium in research or developmental quantities.

METALLO-ORGANICS

More than 300 organic, inorganic and metallo-organic chemicals are available from Stauffer's Anderson Chemical Division (Weston, Mich.); some in commercial, others in research or developmental quantities.

CATALYST SUPERMARKET

You will find a catalyst for almost any purpose among Stauffer's broad range of chemical products. They cover the chemical front from Al to Zr...are available in quantities for research or production...from ampules to tank cars... from 17 sources of supply coast to coast. Note the many types available:

MINERAL ACIDS

Hydrofluoric, Muriatic, Nitric and Sulfuric Acids available in drums to tank cars.

BROCHURES AVAILABLE

Metal Chlorides (36 pages)
Metallo-Organics (40 pages)
Hydrofluoric Acid (40 pages)
Muriatic Acid (44 pages)

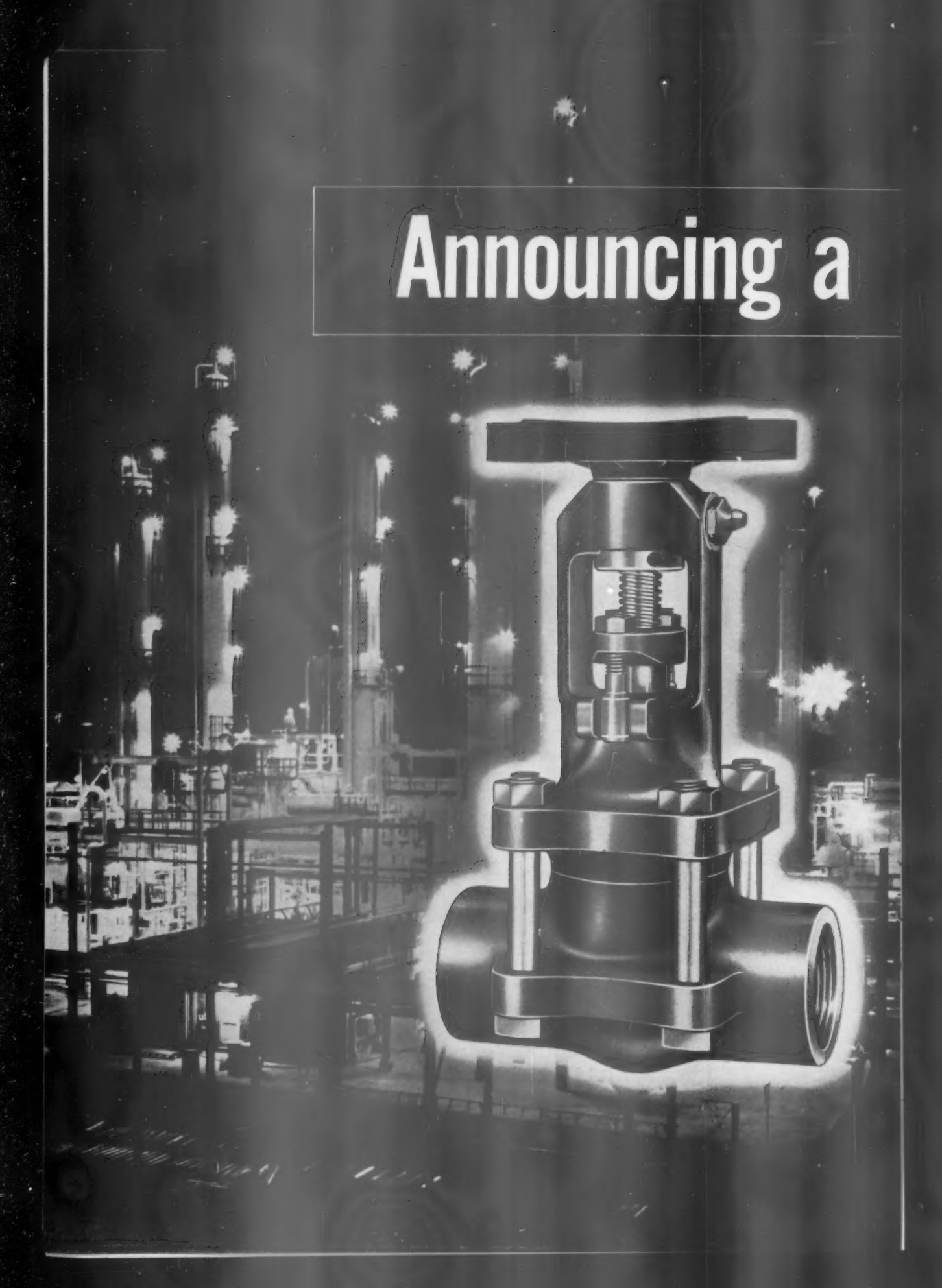
Aluminum Alkyls are now available in developmental quantities and will be available in commercial quantities late this year.

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL COMPANY

380 Madison Avenue, New York 17, New York
Prudential Plaza, Chicago 1, Illinois
824 Wilshire Boulevard, Los Angeles 17, California
636 California Street, San Francisco 8, California
P. O. Box 9716, Houston 15, Texas

Announcing a



new "Partnership"...

to serve you better, faster!

EFFECTIVE IMMEDIATELY: JONES & LAUGHLIN SUPPLY DIVISION WILL DISTRIBUTE

OIC VALVES

Here are the most advanced valve designs for today's petroleum industry.

OIC has served the petroleum industry for over a half century. Their management has always emphasized improved valve design, rigid quality control and thorough product testing.

OIC produces a complete line of bronze, iron, forged steel, cast steel and ductile iron valves. They are available for prompt delivery from any one of J&L's 75 conveniently located supply stores in the United States.

To further assure prompt delivery, store inventories are backed up by factory stocks at key points. The talents and resources of both companies are at your service to satisfy your every valve requirement.

We're out to serve you better than you've ever been served before. Just try us.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

If it's sold by J&L....
It's the best available

The "silk purse" miracle . . .

A complete switch of the proverbial sow's-ear-to-silk-purse procedure! That's what transpired when a UOP researcher succeeded in converting a fraction of gasoline, normal butane, into isobutane . . . for which, at that time, there was not much use!

But development of this new "isomerization technique" paid off. Demand for alkylate for blending into high-octane gasoline suddenly developed. So too, did a demand for isobutane, used in making alkylate . . . and UOP was ready with a butane isomerization process.

Constantly striving for improvement, Universal's continued research has produced a new and better process, Butamer*, now available to refiners the Free World over. Readily and economically integrated with UOP's widely-used Alkylation processes, it provides a practical and profitable way to convert normal butane into the finest quality gasoline.

Research is where you find it . . . and UOP research scientists are constantly alert to unexpected opportunities. For research sometimes makes its contribution where least expected.

*Trademark

UOP®

UNIVERSAL OIL PRODUCTS COMPANY 30 ALGONQUIN ROAD
DES PLAINES, ILLINOIS, U. S. A.
More Than Forty Years Of Leadership In Petroleum Refining Technology

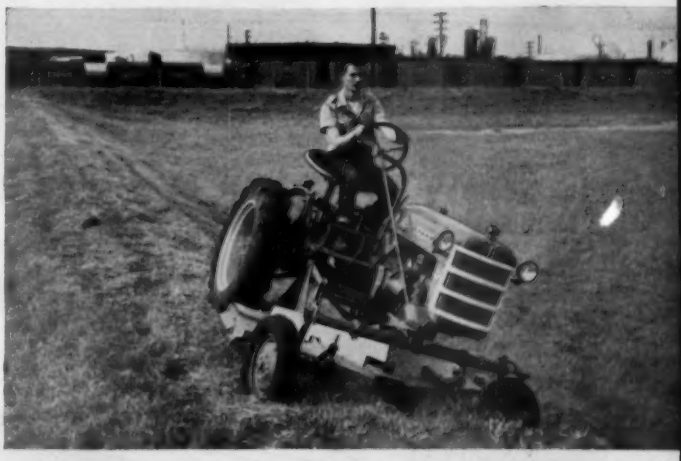
58-inch cut on the heavy-duty, low-cost F-240 tractor. Note how International Danco center mounting lowers center of gravity for steep-slope mowing.

Heavy-duty center-mounted rotary mowers...

Mow big areas fast...fire barriers and all

Center mounting for a low center of gravity, plus IH tractor wide tread, lets your operator work on steep slopes where other types of mowing rigs can't work. Operator rides *above* the blades for maximum safety; special chain shields hug uneven terrain, eliminating danger to buildings, tanks, and personnel from thrown objects. Overlapping blades assure clean mulch-mowing on *any* growth, from finest turf to heavy brush. With non-wrapping spindles, mow non-stop in dew-damp or rain-wet growth—save hours and hours of lost operator time!

Four sizes: 58, 60, 66, and 94 inches on tradition ally-dependable IH tractors, 13.4, 38.5, 45, and 61 maximum flywheel hp. A nearby IH Dealer will demonstrate. For his name, and specification sheets, write International Harvester Company, Dept. OGJ-8. P. O. Box 7333, Chicago 80, Illinois.



60-inch cut International Danco mower for IH Cub® tractors. No other mowing combination does so much while costing so little for mowing fire barriers, compressor station grounds, and similar areas.

See your

INTERNATIONAL HARVESTER dealer

International Harvester Products *pay for themselves in use*—Farm Tractors and Equipment . . . Twine . . Industrial Wheel Tractors . . . Motor Trucks . . . Construction Equipment—Chicago 1, Illinois.

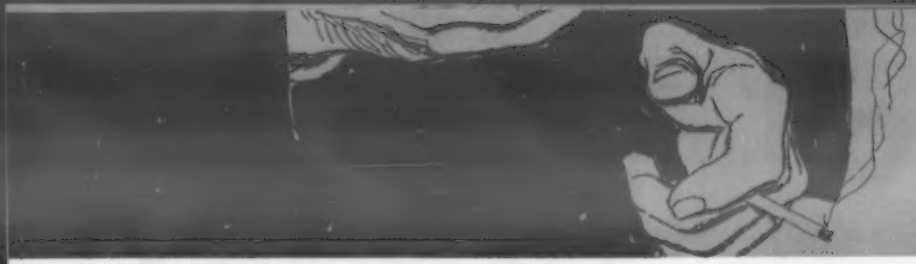
ENGINEERED from EXPERIENCE

all New

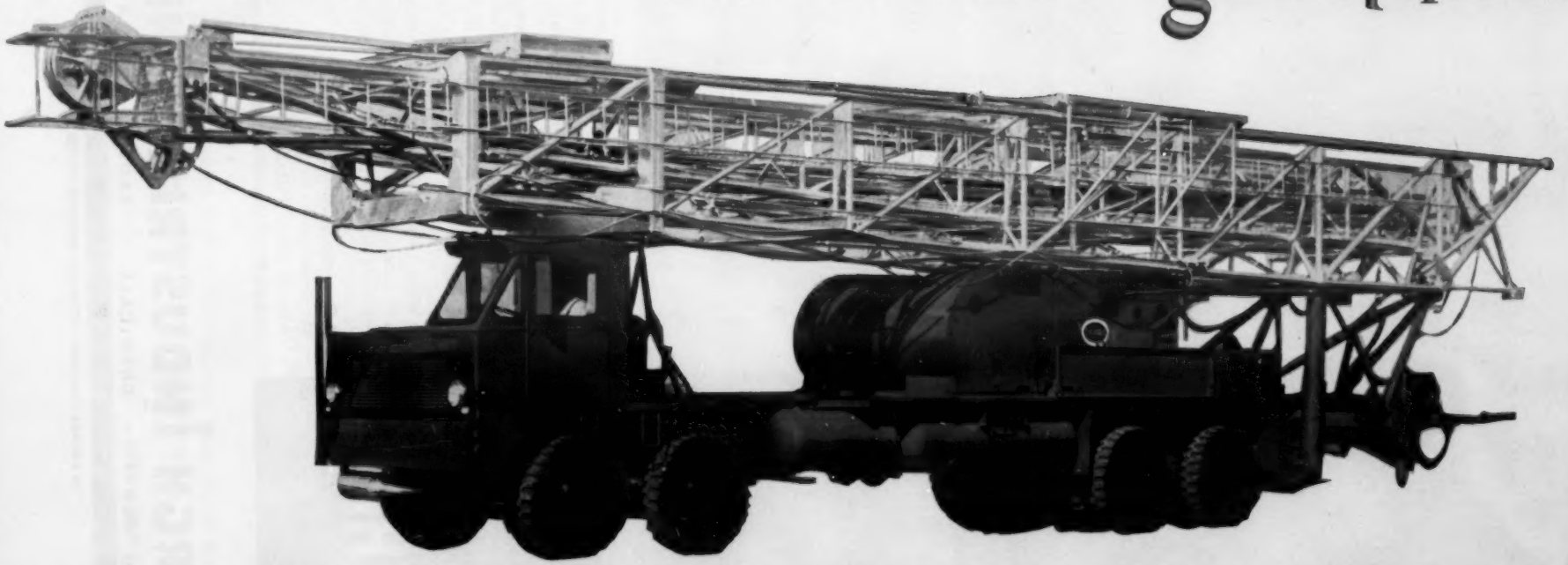
FRANKS EXPLORER

THE EXPLORER is the product of FRANKS 27 years of engineering field experience and pioneering in well servicing units. The EXPLORER is all new from wheels to crown — packed with power up to 400 HP. The most powerful self-propelled servicing and workover rig available. More power to weight ratio.

It looks new because it is ALL NEW!



A GOOD CREW NATURALLY DOES FASTER, SAFER JOBS WITH **Good equipment**



EXPLORER FEATURES

- INDUSTRIAL engine — Waukesha, Cummins, GM or equivalent, up to 400 HP.
- NEW main drum design for fastest, safest pulling.
- NEW water and air cooling brake system.
- NEW hardened, removable floating brake drums.
- NEW easier, faster and safer handling controls.

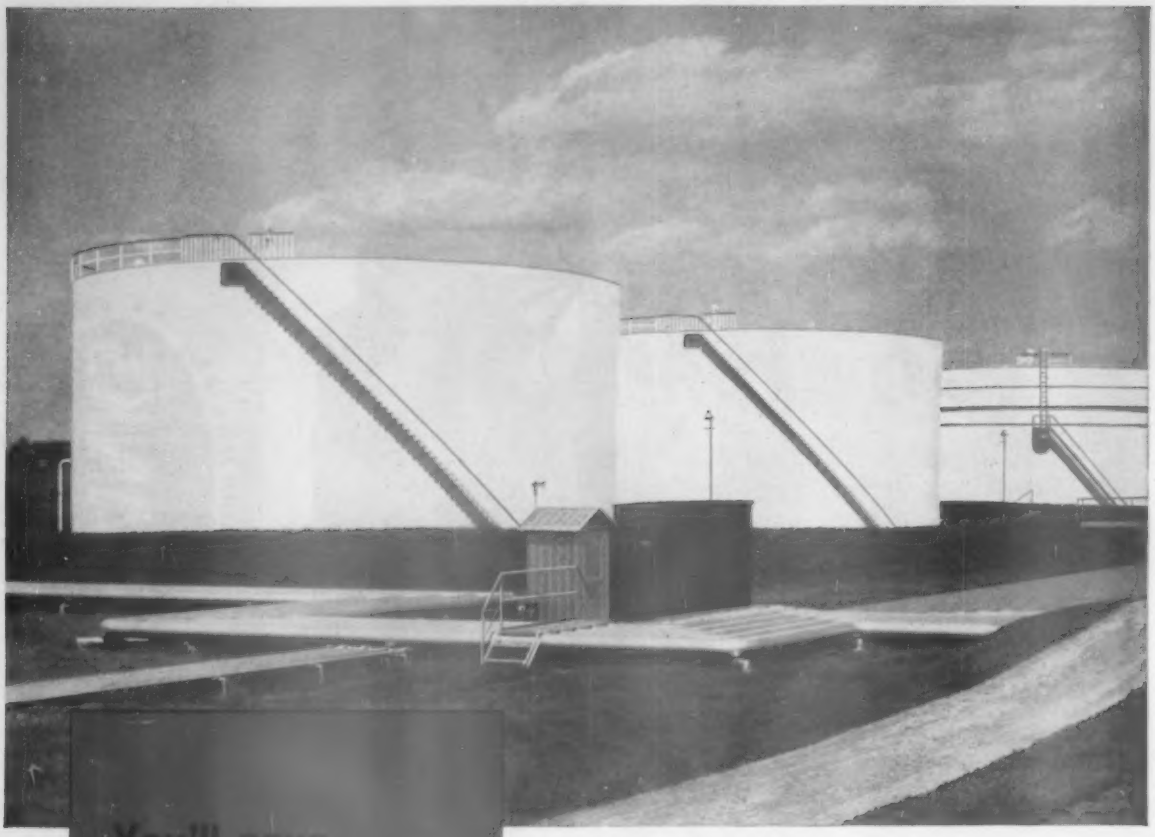
WELL SERVICING AND DRILLING UNITS

FRANKS

DIVISION OF

PAMPA, TEXAS

CABOT SHOPS, INC.



You'll save money two ways with Pittsburgh's Brilliant White

TANKHIDE®

1. More years of protection

2. Lower evaporation loss

For outstanding toughness . . . and economy, too . . . no other protective coating for gasoline and oil storage tanks equals the performance of Pittsburgh's brilliant White TANKHIDE.

● **Made with intensely white** titanium pigments and weather-resistant vehicles, TANKHIDE withstands the destructive effects of corrosion and weather. Self-cleaning action helps to maintain its gleaming whiteness throughout its long life.

● **White TANKHIDE** also provides unusually high solar heat reflectance. This reduces costly losses of volatile petroleum products stored in cone roof and floating roof tanks.

● **Our long experience** in producing finishes of all types for the petroleum industry can save you time and money. Write, wire or phone Pittsburgh Plate Glass Company, Industrial Finishes, 1 Gateway Center, Pittsburgh, Pa.

PITTSBURGH INDUSTRIAL FINISHES

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

New 15,000 psi tester includes automatic equipment for blowing out scale and dirt, stenciling, screwing on couplings, delivering pipe to tester, weighing after testing, screwing on thread protectors and spraying each length with oil.

SPANG's new pipe tester is unique

THE NATIONAL NSCO SUPPLY COMPANY

You can't produce the best quality tubular goods with ordinary facilities. So you obtain the best facilities available—even if, in some cases, the equipment is unique.

This new hydrostatic tester is such a facility. Added in our Ambridge, Pa. plant early this year, it's the only line production machine of its kind designed for a 15,000 psi pressure. It handles pipe up to 5½ in. O.D. and up to 48 ft. long, including plain end, threaded, coupled and upset pipe.

Modern facilities like this new tester insure the quality you always expect and get in Spang Tubular Products.

More on the next page—

STAND

Three points to remember when you buy drill pipe

1. A SPANG drilling string is a fully integrated string

National Supply is the only company in the industry manufacturing both the drill pipe and the tool joints. From this *single* responsible source, you get a string that has carefully controlled quality from start to finish.

2. SPANG leads in tool joint design—the critical area of pipe service life

Spangweld Tool Joints are welded to the drill pipe by an automatically controlled operation insuring accurate alignment and a high quality weld. The welding permits a streamlined contour and a reduced number of threaded elements. This tool joint connection also allows the smallest practical O.D. and maximum bore—a definite advantage for slim hole drilling.

Spang Double Seal Shrink Thread Tool Joints can be easily removed and replaced in the field. Joint design has an outer seal, threads and inner seal all on a single cone. This insures uniform, reliable installations both at the mill and in the field, and completely seals against internal and external pressures.

3. SPANG provides the best selective protection against corrosion and abrasion

Spang Plastic Coating—the result of ten years of research—gives the best protection against corrosion. Scientifically applied at the mill on specially-developed facilities, Spang Plastic Coating is available not only in Spang Drill Pipe but also Spang Casing, Tubing and Line Pipe.

Spang Hardfacing is a superior protection for tool joints in abrasive formations. It consists of multiple bands of tungsten carbide, *continuously* overlapped on the joint to form a solid particle-to-metal band.

Specific proof of these benefits is furnished every day in numerous locations throughout the world. The National representative in your area will be pleased to tell you more.

A National plant inspector checks the destination of an order of hardfaced Spangweld Drill Pipe. Spang Hardfacing consists of multiple bands of tungsten carbide, continuously overlapped on the joint to form a solid particle-to-metal band.

National Drill Collars on the next page . . .

National Drill Collars are simultaneously bored from both ends on this 165-ft. trepanning lathe designed especially for this purpose. The lathe's speed and accuracy obsolete the ordinary type of solid bar drilling.

Use precision-made National Collars for best penetration rates!

Are you looking for ways to improve penetration rates at all drilling speeds, and extend the life of your drill string? Specify National Drill Collars and you'll see new results because of these features:

High strength properties—National Collars are made from alloy steel, hardened and tempered *full length* (not just ends only) for high strength. As an additional safeguard against fatigue failure, National "Tuf-Flexes" its drill collar joints by cold-rolling or peening.

True center bores—These are established by a special 165-ft. trepanning lathe which precisely bores both ends of the collar simultaneously. All bores are carefully surveyed for concentricity to insure proper balance while rotating at normal and high drilling speeds.

Stress relief grooving—To improve the fatigue resistance of drill collar joints, National machines a stress relief groove at the last engaged thread zone of both box and pin members. The pin relief groove is designed to protect the shoulder corner as well as the stress concentrating zone at the last engaged thread.

Along with performace records, features like these are proof that you can't buy a better drill collar than National's. So get the best—and the operating benefits that go with it. See a National representative about the drill collar sizes to meet your needs. He can also give you some valuable tips on collar care and handling.

Replaceable End Collars

National also manufactures a complete line of drill collars with replaceable ends—incorporating a modification of the time-tested double seal shrink thread principle—for use in isolated areas where field shop facilities may not be available.

THE NATIONAL SUPPLY COMPANY

Subsidiary of Armco Steel Corporation

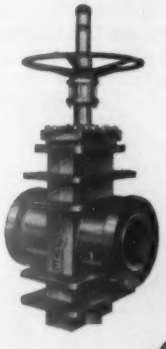
TWO GATEWAY CENTER, PITTSBURGH, PA.

DIVISION OFFICES: Calgary, Dallas, Denver, Houston, Toledo, Torrance, Tulsa

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E.C.1

IN CASE OF ANY EMERGENCY

HERE'S THE VALVE YOU KNOW WILL WORK



This is a rugged, dependable valve you can forget until you really need it. When you do—it'll work. There's no wedging to cause wear and jamming. The polished gate slides easily and quickly between smooth metal seats and rugged "O" rings. Exclusive Grove design lets gate and seats float free—eliminates distorting effects of pipe-line strain, internal pressure and temperature. Requires as many as 250 less turns to close than some competitive valves, too.

And, there's no lubricant to forget or to be washed away. Tough, flexible "O" rings are always there when you need them to give a bubble tight seal every time.

The next time you need valves, call your Grove man. He has the valves you can really depend on.

GROVE VALVE and REGULATOR COMPANY

65th & Hollis Street, OAKLAND 8, California

HOUSTON 27—3203 Mercer St. • LOS ANGELES 6—2559 W. Olympic Blvd.

ODESSA • TULSA • DENVER • CHICAGO • NEW YORK • DALLAS • PITTSBURGH

FARMINGTON, N. M. • LAFAYETTE, LA. • HARVEY, LA. • LONGVIEW, TEXAS

In Western Canada: GROVE VALVE LTD., EDMONTON

DIRECTIONAL DRILLING • FISHING & CUTTING • ELECTRICAL WELL SERVICES • OILFIELD SUPPLIES • EXPORT TOOLS & SERVICE

HOMCO

Fishing, Cutting

THE HOMCO WASHOVER DRILL COLLAR SPEAR

prevents drill collars from falling during washover operations

When you call Homco for a fishing or cutting job you know you are getting the most skilled help in the oil fields. Thirty one years experience in the field enables Homco to offer you an unequalled service. Trained and experienced operators use the Homco designed tools that get the job done fast.

As an example, in many instances drill collars are lodged some distance from the bottom of the hole and when washed over they fall to the bottom, necessitating an extra trip into the hole to retrieve them. And, in many cases the collars lodge on the bottom requiring additional washover operations.

The Homco Drill Collar Spear is designed to prevent this. This tool has the spear attached to the wash pipe through shear pins allowing the spear to be screwed into the joint connection of the collar. After the connection is made the pins are easily sheared, allowing washover to begin. The spear is in the catch position as the collars are washed over preventing the collars from falling. A free point indicator may be operated through this tool at any time.

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engineering
development
manufacturing

HOMCO

HOUSTON OIL FIELD MATERIAL COMPANY

WORLD'S LARGEST INDEPENDENT OILFIELD SUPPLY AND SERVICE ORGANIZATION

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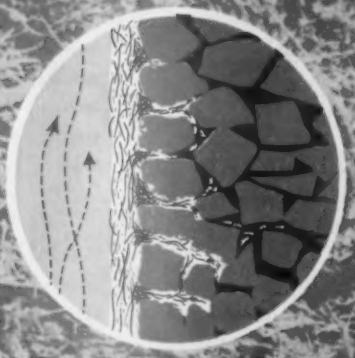
WRITE FOR TECHNICAL INFORMATION AND BROCHURES

Printed in U.S.A.

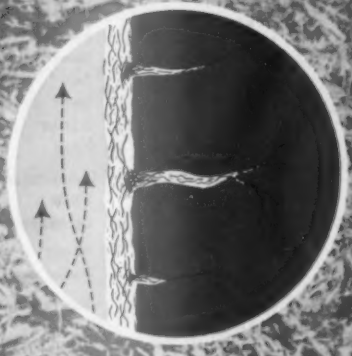
HOMCO has it!

Seeing is believing

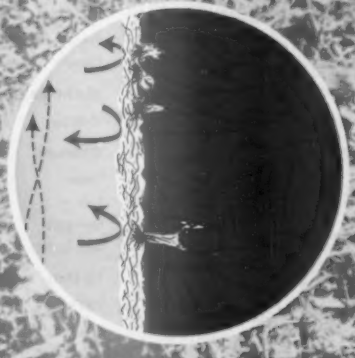
FIBERTEX*



SEALS FORMATION PORES



SEALS FORMATION FRACTURES



RESISTS DECOMPOSITION

strong fibers *permit mud circulation without loss.*

FIBERTEX . . . bridges formation pores and blocks fractures to prevent or stop mud loss.

FIBERTEX . . . graded fiber sizes give quicker, more effective sealing.

FIBERTEX . . . mixes easily, works fast, resists decomposition. A little goes a long way.

BAROID

BAROID DIVISION
NATIONAL LEAD CO.

Main Office: P. O. Box 1675, Houston 1, Texas

*Registered trade mark, Baroid Division National Lead Co.

5906

Continental-Emsco's PRECISION HERE

. . keeps wells pumping longer

C-E's D+B pump shops are manned by trained, field experienced specialists using modern equipment and methods. The result: *superior service.*

Precision micrometers, gauges and special test equipment are used to check OD of plungers . . ID of liners and tubes . . pressure-test pumps after assembly. Special C-E designed aligning mandrels and clamps are used to accurately assemble and repair sectional liner pumps and composite plungers. Special vises prevent distortion of tubes and plungers. The use of friction tongs eliminates pipe wrench marks . . open doors for corrosive fluids. Vacuum testers are used to test fluid seal of valves. Desanding equipment is used to remove frozen plungers and entire pumps from sanded joints often saving considerable money by salvaging parts. Cooking vats and steam cleaning equipment remove paraffin and other deposits and also eliminate corrosive effects of salt water during pump repair. Each shop has special equipment to handle the popular pumps of the area.

Continental-Emsco's training program keeps personnel "up" on all types of pumps, improved methods of assembly and new materials. You always get a longer *pumping* run for your dollar at Continental-Emsco D+B pump shops.

For Service that Sings . . Equipment that Hums . . Go . .

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

P908

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Export Division: 30 Rockefeller Plaza, New York, N. Y. • Continental-Emsco Company Limited • General Offices: Calgary, Alberta, Canada
Continental-Emsco Company C. A., Caracas, Venezuela • Plants: Houston and Gaeland, Texas; St. Albans, Herts., England • Representatives in All Principal Oil Fields of the World

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Drayton Valley
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MANITOBA
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Tatum

NORTH DAKOTA
Williston

WYOMING
Casper
Cody
Newcastle
Rock Springs

Tri-State Area

ILLINOIS
Salem

INDIANA
New Harmony

August 27, 1959—Oil's 100th Birthday

A Great Day for Every Oil Man and Woman

100 years ago Colonel Edwin L. Drake drilled the first commercially successful oil well.

Of all the many uses for petroleum during the past century—as an illuminant, a lubricant, a source of chemicals—its most important use has been *as a source of abundant, low-cost energy.*

The progress of any nation can be measured by the amount of energy it consumes—for heat, light, transportation, agriculture, industry.

We in America produce and use 40% of all the energy consumed in the world—enjoy the highest standard of living in the world. More than two-thirds of our energy comes from oil and natural gas.

By August 27, 1975, America's energy needs will have doubled. Oil and natural gas will be called upon to supply two-thirds of this need—or 30% more energy than we now derive from all energy sources combined.

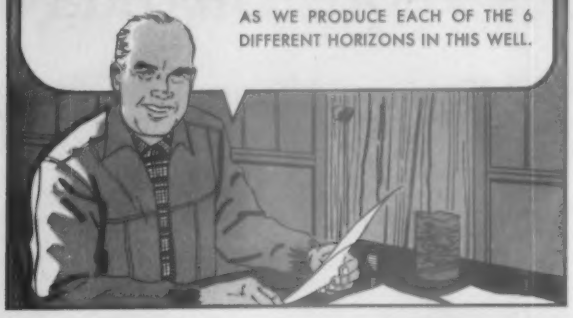
Every oil man and woman shares a quiet pride in the progress of our first century—and confidence in our ability to meet the challenges of the second.

As we look ahead to our second century, we join all other American business and industry in giving thanks for America's unique climate of freedom—from which all *past* success has come . . . on which all *future* success depends.

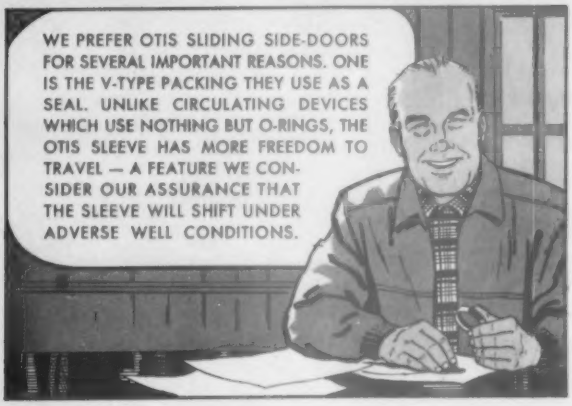
Committee on Public Affairs
of the
American Petroleum Institute
50 West 50th Street • New York 20, New York

OTIS SLIDING SIDE-DOOR EQUIPMENT
WILL SAVE US SEVERAL HUNDRED DOLLARS PER ZONE

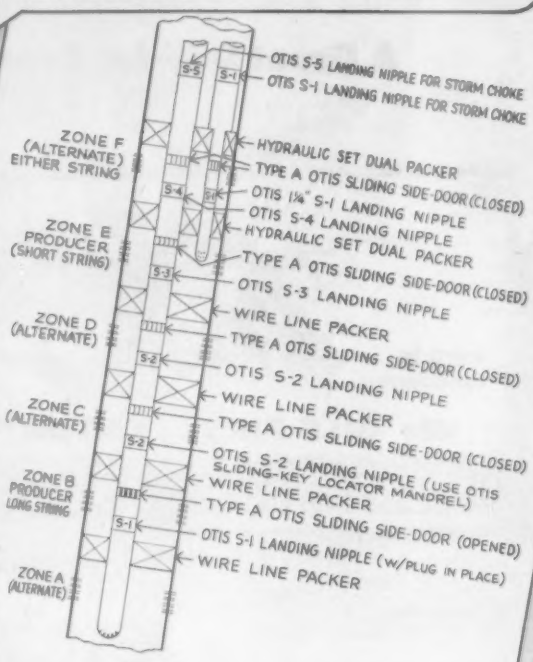
AS WE PRODUCE EACH OF THE 6 DIFFERENT HORIZONS IN THIS WELL.



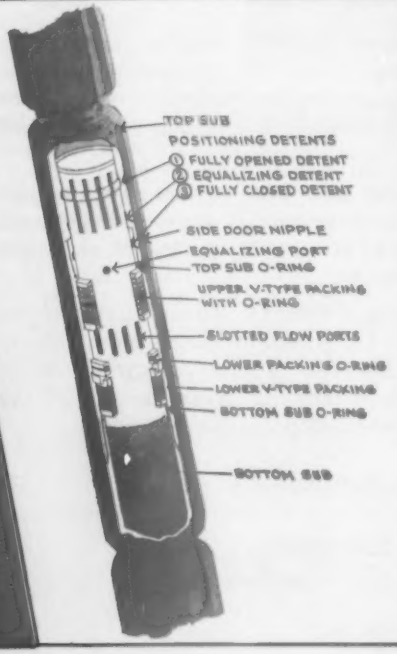
WE PREFER OTIS SLIDING SIDE-DOORS FOR SEVERAL IMPORTANT REASONS. ONE IS THE V-TYPE PACKING THEY USE AS A SEAL. UNLIKE CIRCULATING DEVICES WHICH USE NOTHING BUT O-RINGS, THE OTIS SLEEVE HAS MORE FREEDOM TO TRAVEL — A FEATURE WE CONSIDER OUR ASSURANCE THAT THE SLEEVE WILL SHIFT UNDER ADVERSE WELL CONDITIONS.



ADD TO THAT THE THOUSANDS OF DOLLARS WE SAVED BY DRILLING ONLY ONE WELL TO PRODUCE THESE 6 FORMATIONS AND YOU'LL SEE WHY WE'RE SOLD ON MULTIPLE-ZONE WELLS AND OTIS SLIDING SIDE-DOOR EQUIPMENT. HERE'S A DIAGRAM OF THE WELL.


S-5
S-1
OTIS S-5 LANDING NIPPLE FOR STORM CHOKE
OTIS S-1 LANDING NIPPLE FOR STORM CHOKE
ZONE F (ALTERNATE) EITHER STRING
HYDRAULIC SET DUAL PACKER
TYPE A OTIS SLIDING SIDE-DOOR (CLOSED)
S-4
OTIS 1¼" S-1 LANDING NIPPLE
OTIS S-4 LANDING NIPPLE
ZONE E PRODUCER (SHORT STRING)
HYDRAULIC SET DUAL PACKER
TYPE A OTIS SLIDING SIDE-DOOR (CLOSED)
S-3
OTIS S-3 LANDING NIPPLE
WIRE LINE PACKER
ZONE D (ALTERNATE)
TYPE A OTIS SLIDING SIDE-DOOR (CLOSED)
S-2
OTIS S-2 LANDING NIPPLE
WIRE LINE PACKER
ZONE C (ALTERNATE)
TYPE A OTIS SLIDING SIDE-DOOR (CLOSED)
S-2
OTIS S-2 LANDING NIPPLE (USE OTIS SLIDING-KEY LOCATOR MANDREL)
WIRE LINE PACKER
ZONE B PRODUCER LONG STRING
TYPE A OTIS SLIDING SIDE-DOOR (OPENED)
S-1
OTIS S-1 LANDING NIPPLE (W/PLUG IN PLACE)
WIRE LINE PACKER
ZONE A (ALTERNATE)

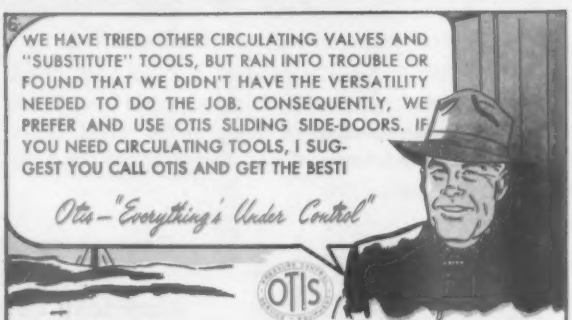
THEN THERE'S OTIS' VERTICAL SLOTTED PORT DESIGN. THIS GIVES OTIS SLIDING SIDE-DOORS MAXIMUM STRENGTH—AND ACTS TO PREVENT DISTORTION OF THE TOOLS AS THEY ARE SUBJECTED TO THE STRESS AND TORQUE OF A PRODUCTION STRING. HERE'S A DETAILED DRAWING OF THE TYPE A OTIS SLIDING SIDE-DOOR. NOTICE THE DESIGN ADVANTAGES.



5. ANOTHER ADVANTAGE OF THIS OTIS EQUIPMENT IS THAT WITH THEIR SHIFTING TOOL THEY CAN OPEN AND/OR CLOSE ONE OR SEVERAL SLEEVES WITH JUST ONE TRIP OF THE WIRE LINE. AND YOU'RE SURE THE SLEEVES ARE FULLY SHIFTED, TOO. OTIS' SHIFTING TOOLS WON'T RELEASE UNTIL THE SLEEVES ARE EITHER FULLY OPENED OR FULLY CLOSED. OTIS HAS AN EXPENDABLE SHIFTING TOOL IN ADDITION TO THEIR WIRE LINE TOOL, THAT CAN BE PUMPED DOWN WITH THE MUD PUMP DURING COMPLETION WORK TO CLOSE THE SLEEVES.

WE HAVE TRIED OTHER CIRCULATING VALVES AND "SUBSTITUTE" TOOLS, BUT RAN INTO TROUBLE OR FOUND THAT WE DIDN'T HAVE THE VERSATILITY NEEDED TO DO THE JOB. CONSEQUENTLY, WE PREFER AND USE OTIS SLIDING SIDE-DOORS. IF YOU NEED CIRCULATING TOOLS, I SUGGEST YOU CALL OTIS AND GET THE BEST!

Otis—"Everything's Under Control"



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They Say—

Purer gas produced

Dear Sir:

After presentation of the paper, "The Giammarco-Vetrocoke Processes for Acid Gas Removal," in The Oil and Gas Journal (May 11, p. 86), we discovered an error which we sincerely hope to correct with your assistance.

The mistake appeared in Table 2, page 89. The value given for "H_2S out, grain/100 std. cu. ft." under "Manchester" should be 0.1 gr./100 std. cu. ft., instead of 0.25 gr./100 std. cu. ft.

This may appear to be a small matter, but it means a great deal to the owners of this process, who brought the unfortunate oversight to our attention.

Since the Manchester process is capable of producing gas of considerably higher purity than indicated in our paper, we hope that The Oil and Gas Journal will be able to set the record straight.

William R. Walker
Manager of Public Relations
Fluor Corp., Los Angeles

"Unknown" is known well

Dear Sir:

I never write "letters to the editor," but I make an exception this once to offer constructive criticism.

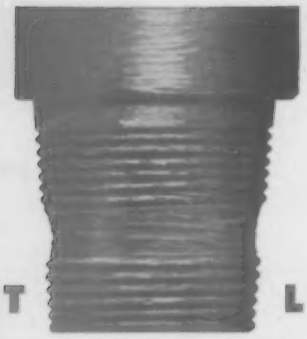
I refer to your paragraph concerning the Sheffield channel in The Oil and Gas Journal, July 6, p. 171. I read there, and in previous issues of the Journal, certain statements that lead one to an erroneous conception of where the Sheffield channel is and its relationship to the Val Verde basin.

First, you suggest that Brown Bassett field is in the Sheffield channel . . . actually the southern boundary of the channel is approximately 15 miles north.

Second, "this all-but-unknown channel" was named in 1932 and has been discussed and described in the AAPG bulletins several times since. A large amount of data are available to define the channel and its history.

Third, you say the channel "connects the Delaware and Val Verde basins." In fact, the channel connects the Delaware and Midland basins and has no connection with the Val Verde basin other than being superimposed on its north limb.

The circumstances are these: The Sheffield channel exists only in Per-



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Add to the life of your drill string connections with WECO Compounds . . . No-Gall for those who prefer zinc base compounds; Lo-Tork for those who want a lead base compound. Your Supply Store carries complete stocks of both.

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mian time, being bounded on the north by the Central Basin platform and on the south by what is locally called the "Southern shelf" or is referred to in literature as the "Fort Lancaster platform." The west end opens into the Delaware basin and the east end into the Midland basin.

The Val Verde basin does not exist later than Wolfcamp time. It is strictly an early Permian and pre-Permian feature with its synclinal axis partly coincident with the western end but mostly south of the Sheffield channel. The Val Verde basin is bounded on the north by the Central Basin platform, the "Ozona platform," and the Eastern shelf while the southern limit is practically unknown. This is the feature that is "all-but-unknown."

The Val Verde basin extends far beyond geologic and geographic limits of the Sheffield channel and joins, uninterrupted, with the pre-Permian Delaware basin to the northwest and courses toward the Kerr basin to the southeast.

Some confusion must arise due to the fact that the Permian configuration and the pre-Permian configuration of the Delaware basin are nearly the same and superimposed while the Sheffield channel and Val Verde basin are two separate and distinct features each having its own definition and configuration.

Marshall Mason, Jr.
Union Oil Co.
Midland, Tex.

Monterey's philosophy

"Oil and gas exploration today is a highly technical activity and the decisions regarding where and how to search make the difference between growth and liquidation.

"The only way to be sure of finding oil and gas is to look for it in the fairways, to look where it is being found in paying quantities. Today, Monterey's exploration activities are being carried on in three fairways, California offshore, the Permian basin of West Texas and southeast New Mexico, and onshore coastal Louisiana.

"We also believe it's good business to maintain interests in long-shot areas of potential importance. Consistent with this idea, we hold about 300,000 acres in Alaska and have joined with others in a farmout arrangement with General Petroleum which will drill a first test well this summer. Several years ago we began acquiring leases in Mississippi when it was truly a long-shot area. It is fast becoming a Lower Cretaceous fairway and we are ex-

ceedingly pleased with our position there."

Howard C. Pyle, president, Monterey Oil Co., in a speech to the New York Society of Security Analysts.

Electrical experimentation

Dear Sir:

I am very much in agreement with George O. Williams in his theory and practice of surface logging (OGJ, June 15, p. 154).

I think that valuable information can be obtained in certain areas with this type of logging. I had the pleasure of working for a major oil service company that does electrical logging of drilled holes with excellent results. This same equipment, with a few small changes, was used for experimental work in shallow water wells and limited surface logging with fair results.

The results of these experiments were very interesting because of the survey's correlation with recent formations of drilled wells. These experimental surveys were made in the Illinois basin area during the winter months with extreme dampness existing.

Paul E. Dowden
Houston

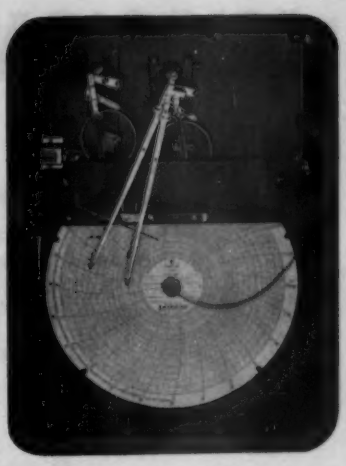
CALENDAR OF EVENTS

AUGUST

- 3-7 University of Minnesota, continuation course, chemical interpretation of infrared spectra, Minneapolis.
- 6 Southern Gas Association, American Gas Association, public relations roundtable conference, Heidelberg Hotel, Jackson, Miss.
- 7 Southern Gas Association roundtable conference on pipeline operation and maintenance, St. Anthony Hotel, San Antonio, Tex.
- 10-13 Society of Automotive Engineers, national West Coast meeting. Hotel Georgia, Vancouver, B. C.
- 14 Southern Gas Association, transmission management conference, Sheraton-Dallas Hotel, Dallas.
- 10-28 Louisiana Polytechnic Institute, Lou-Ark section of AIME, graduate summer session in reservoir engineering, Louisiana Polytechnic Institute, Ruston, La.
- 12-15 Billings, Mont., Geological Society, tenth annual field conference, Disturbed Belt area of northwestern Montana, registration, August 12, Great Falls, Mont.
- 18-21 Western Electronic Show and Convention, San Francisco.
- 23-26 American Institute of Electrical Engineers, sixth electrical conference of the petroleum industry, Wilton Hotel, Long Beach, Calif.
- 24-25 North Dakota Oil and Gas Association, annual meeting, Grand Pacific Hotel, Bismark, N.D.
- 24-26 West Virginia University, annual Appalachian gas measurement short course, Morgantown, W. Va.
- 26-27 Petroleum Symposium, "The Next 100 Years," University of Houston, Houston.
- 26-28 Pennsylvania Grade Crude Oil Association and Pennsylvania State University, twenty-first technical conference on petroleum production, Penn State campus, University Park, Pa.
- 27 Oil Centennial Day, Titusville, Pa.

SEPTEMBER

- 3-5 Northwestern International Oil Scouts Association, annual meeting, Prince of Wales Hotel, Waterton National Park, B. C.
- 9-11 American Society of Mechanical Engineers, American Society of Civil Engineers, West Coast conference of applied mechanics, Stanford, Calif.
- 9-11 Pacific Coast Gas Association, annual meeting, Ambassador Hotel, Los Angeles.
- 9-12 Intermountain Association of Petroleum Geologists, annual field conference, western high Uintas, registration, September 9, Provo, Utah.
- 10-12 Magic Plains Oil Exposition, Borger, Tex.
- 14 American Petroleum Institute, University of Texas, seventh session of school of pipeline technology, Lee College, Baytown, Tex.
- 14-16 Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston.
- 15-16 American Gas Association, Southern Gas Association, eleventh annual accident prevention conference, Dinkler Plaza Hotel, Atlanta.
- 16-18 Wyoming Geological Association, field conference, Big Horn Basin, registration, Cody, Wyo.
- 16-18 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.
- 17 Natural Gasoline Association of America, Rocky Mountain regional meeting, Wyoming-Gladstone Hotel, Casper, Wyo.
- 20-23 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Rice Hotel, Houston.
- 21-23 Columbia University, oil refinery workshop on passive element analog computers, Engineering Building, Columbia University, New York.
- 21-25 Instrument Society of America, annual instrument-automation conference and exhibit, International Amphitheater, Chicago.
- 23-24 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting. Henning Hotel, Casper, Wyo.
- 24-25 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division annual meeting, Roosevelt Hotel, New Orleans.
- 27-29 National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Leamington, Minneapolis.
- 27-30 American Institute of Chemical Engineers, national meeting, Hotel St Paul, St. Paul.
- 29-30 Western Petroleum Refiners Association, management seminar, Western Hills, Waggoner, Okla.
- 28-Oct. 1 American Welding Society, fall meeting, Sheraton-Cadillac Hotel, Detroit.
- 29-Oct. 1 National Association of Corrosion Engineers, western region conference,



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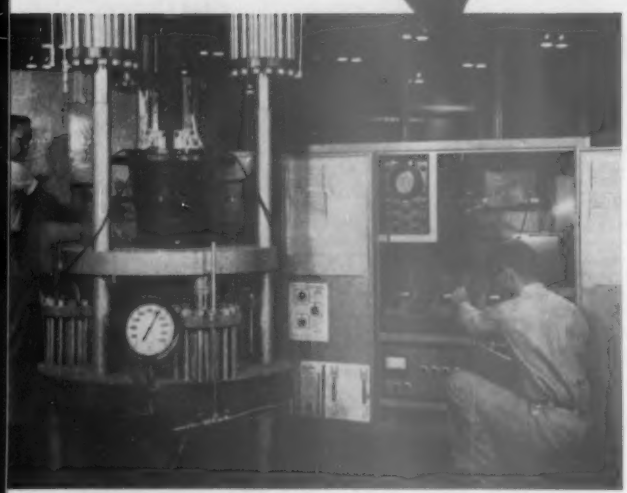

Mission Slips in 600,000 lbs. capacity slip test machine, with fourteen channel recording oscillograph measuring strains in slips and pipe.

Field and laboratory tests proved that these slips are built like a bridge with plenty of strength but no excess weight. They weigh only 130 pounds; so you won't break your back setting them. Yet, they have all the heavy-duty features you will ever need. You can hold drill pipe with hook loads of 275,000 lb. and drill pipe sizes 2⅜" through 4¾". The lightweight results from a new design based on sound and proved engineering principles.

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These new slips—built like a bridge—are one more proof Mission knows drilling problems and knows how to overcome them. Available at your supply store.

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OCTOBER

1-2 National Association of Corrosion Engineers, southeast region conference, Jacksonville, Fla.

2-3 Association of Desk and Derrick Clubs of North America, eighth annual convention, Hilton Hotel, San Antonio, Tex.

4-7 Society of Petroleum Engineers of AIME, fall meeting, Memorial Auditorium, Dallas, Tex.

5-7 American Gas Association, annual meeting, Conrad Hilton Hotel, Chicago.

5-7 National Association of Corrosion Engineers, northeast region conference, Lord Baltimore Hotel, Baltimore.

5-10 Society of Automotive Engineers, national aeronautic meeting, aircraft manufacturing forum, and aircraft engineering display, The Ambassador, Los Angeles.

7-8 Western Petroleum Refiners Association, fourth annual stream pollution and waste disposal conference, Broadview Hotel, Wichita.

7-10 Rocky Mountain Association of Geologists, eleventh annual field conference, Saratoga Inn, Saratoga, Wyo.

8-9 California Natural Gasoline Association, annual fall meeting, Huntington-Sheraton Hotel, Pasadena, Calif.

8-10 American Association of Petroleum Geologists, Southwestern Federation of Geological Societies, second annual regional meeting, Coliseum, Lubbock, Tex.

8-10 Exploration Drilling symposium, sponsored by University of Minnesota, Colorado School of Mines, and Pennsylvania State University, University Park, Pa.

8-11 Louisiana Gulf Coast Oil Exposition, Lafayette, La.

11-13 American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City.

11-16 American Society for Testing Materials, Pacific area national meeting, Sheraton - Palace Hotel, San Francisco.

12-15 National Association of Corrosion Engineers, south central region conference, Cosmopolitan Hotel, Denver.

13-14 Seventh Annual Gas Measurements Institute, National Guard Armory, Liberal, Kans.

20-22 American Standards Association, national conference on standards, Sheraton-Cadillac Hotel, Detroit.

20-22 National Association of Corrosion Engineers, north central region conference, Cleveland.

20-22 American Society of Mechanical Engineers, American Society of Lubricating Engineers, lubrication conference, Sheraton - McAlpin Hotel, New York.

22-23 American Institute of Mining, Metallurgical, and Petroleum Engineers, Los Angeles Basin section, fall meeting, Huntington Sheraton Hotel, Pasadena, Calif.

23 Natural Gasoline Association of America, southern regional meeting, Carlton Hotel, Tyler, Tex.

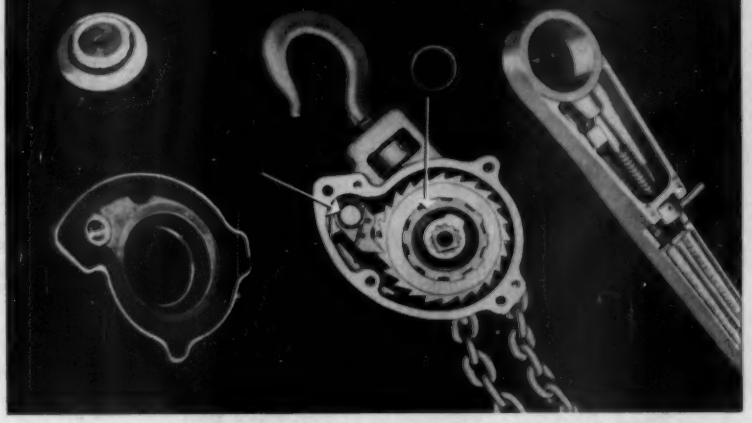
26-27 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel, Dallas.

26-27 Independent Natural Gas Association of America, annual meeting, Westward Ho Hotel, Phoenix.

26-28 Society of Automotive Engineers, national transportation meeting, La Salle Hotel, Chicago.

NEW Coffing SEALED Safety Pull Ratchet Lever Hoist

For Efficient Hoisting In Any Weather



Here is a new hoist designed for safe, efficient hoisting in any weather. Loads will not slip because the brake mechanism of the Safety Pull Hoist is permanently sealed in five places against moisture, oils, chemicals and dirt—all common causes of hoist slippage.

The spring-loaded Neoprene seals assure that brake performance will remain constant under all exposure conditions. Another advantage of the sealed brake is that it will not freeze or lock—is always free to lower even after accidental overload.

Safety features include the exclusive Safety Handle which bends to indicate overload. The free chain control is protected so that it will not accidentally trip.

The Safety Pull Hoist is easy to operate. The handle pull to lift rated load requires minimum effort. Load spotting is precise to within a fraction of an inch. Up and down controls are away from operator's hand so he can use shorter leverage for greater speed with light loads. Ball bearing swivel load hook and plated chain are additional features.

Five models, ¾, 1½, 3, 4½ and 6-ton capacities are available. For additional information see your favorite supply store or write for Bulletin ADH-78.

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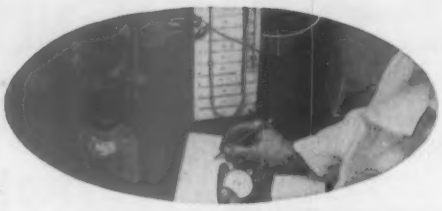

A look at today...and a glimpse

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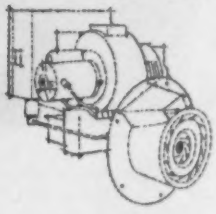
Where they work today

Fuel oils—gasolines—asphalts. Every major area in refining can profit from Armour Chemicals. There is a variety of economical, oil soluble, cationic chemicals for each special job. Some function as additives for direct use in finished products; others are ideal as corrosion inhibitors during processing; still others perform as versatile chemical intermediates in the making of new products.

Fuel Oil Additives

The Armolads® are Armour's series of special furnace oil additives. They have been proved efficient at costs of less than 1¢/bbl.—making them the most economical fuel oil additives now being offered refineries.



All the Armolads are ashless additives. They are of the inhibitor-dispersant type and will impart corrosion inhibiting properties.

Armolads are fatty amine derivatives and are 100% active. It has been proven that the Armolads will effectively stabilize oil against insoluble gum formation and color degradation, and improve filterability without promoting emulsions in furnace oils from various crude sources.

Physical characteristics

	Pour Point	Specific Gravity
Armolad F22	28°F	0.857 at 79°F
Armolad F24	64°F	0.856 at 79°F
Armolad F25	62°F	0.835 at 84°F
Armolad F26	38°F	0.822 at 79°F
Armolad F28	52°F	0.840 at 79°F
Armolad F20	Melt Pt (approx) 115°F	0.797 at 138°F

Comparison tests (Mid-East stock)

	12 months ambient storage Mg/liter	DuPont's 13 week test Mg/liter	UltraViolet light test Mg/liter
Control	134	36.0	64.5
Armolad F22	68	4.0	20.5
Armolad F20	74	4.0	23.5
Competitor M	139	102.5	23.5

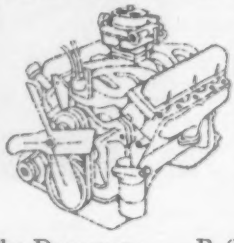
All crude stocks—Mid-Continent, Mid-East, West Texas, and Venezuelan—can be improved by one of the Armolads.

Armour will recommend a specific Armolad for the crude oil you're processing and help you determine the optimum concentration needed to do a satisfactory job economically.

For more information on the entire series of Armolads, check "A" in the coupon.

Gasolines

Armour Chemical offers refiners several chemicals that have found wide acceptance as gasoline additives. Both the Armeens® and Duomeens® are used as anti-stalling additives.



The Armeens . . . $R(NH_2)$—are high molecular weight aliphatic amines. They are cationic surface active agents and have the ability to change surfaces from hydrophilic to hydrophobic.

The Duomeens . . . $R(NH)CH_2CH_2CH_2(NH_2)$ . . . are Armour's series of N-alkyl trimethylene diamines. They are prepared according to the following reaction:

$$RNH_2 + CH_2{=}CH_2\ C{\equiv}N \xrightarrow{H_2} RNHCH_2CH_2CH_2NH_2$$

The Armeens and Duomeens are excellent corrosion inhibitors. Both can be reacted with various organic or inorganic acids to give you additional versatile additives which will impart the following characteristics: (1) excellent detergency, (2) improved thermal stability, (3) increased lubricity.

For more information on the Armeens and Duomeens as they are applied in refinery applications, check "B" in the coupon.

Asphalts

If you have an additive requirement when marketing asphalt, it will profit you to know more about the Redicotes® and Duomeen T. Armour's chemicals for this area of refining are designed to help you make treated asphalt that will pass difficult state stripping tests. They're effective at concentrations as low as 0.2%. Even at such a low concentration they im-

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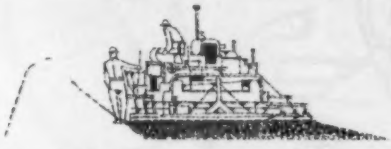
prove adhesion of asphalt to damp or wet aggregates, permitting contractors and highway departments—your customers—to extend their paving season.



Many asphalt plants and refineries are using Duomeen T or Ethoduomeen T/13 as a starting material for making their own asphalt adhesion agents. Let Armour's technical staff assist you in formulating your own anti-stripping additive.

Chemical-physical properties of Redicotes

(Salts of Polyamines derived from tallow)

Redicote	Pour Point	Typical SSF Viscosity	Typical Sp. Gr. @ 20°C	Per Cent Active
76	120°F	25 (@ 140°F)	0.859	100
77	110°F	45 (@ 122°F)	0.875	100
79-S	105°F	40 (@ 122°F)	0.894	100
80-S	60°F	127 (@ 122°F)	0.940	100

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NEWS NOTES

London, England. A new, improved corrosion inhibitor has been developed for application in both refinery streams and in metal working oils. The inhibitor is formed by reacting an Armour diamine with wool grease olein.

•

Hamburg, Germany. Difficult performance specifications now required by growing industrial demands have been met by incorporating an Armour amine into crankcase lubricants and an Armour diamine into diesel oils.

•

Cleveland. Increased die life, cleaner surfaces, the elimination of breaks, and the stopping of chattering is being accomplished by oil soluble diamine salts at one of the large tube manufacturers in this area.

•

Wilmington, South Carolina. Within the past month, new asphalt test roads have been laid here from finely dispersed, stable cationic emulsions. The emulsions were prepared with Armour's cationic surfactants.

•

San Francisco. Drum corrosion is being effectively combatted by an Armour diamine at concentrations of ½ to 1% in a product consisting of phenolic and chlorinated chemical dissolved in kerosene.

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Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

the Journal said...

50

August 6, 1909

Associated Oil Co. builds two additional 500,000-bbl. earthen oil reservoirs at Kern River, Calif., in move to boost surplus reserve stocks to 4,000,000 bbl. Associated has been operating with less than 1,000,000 bbl. of aboveground reserve. Now program calls for cement-lining all reservoirs to cut seepage losses.

New tariff law, passed at insistence of President Taft over protests of independent oil producers, places petroleum and its products on duty-free list.

Disastrous Texas coast hurricane sweeps Hoskins Mound field, in Brazoria County, and Markham field, in adjoining Matagorda County. It levels all derricks, and wrecks all boiler, pump, and other field buildings, and lease and storage tanks.

25

August 2, 1934

New drilling gets under way in old Boulder field, scene of Colorado's biggest oil boom at turn of century. Seven of the fifty wells drilled in the field at that time still produce, averaging 3 bbl. daily.

Louisiana enacts law levying $50 fee on each well drilled to go to a fund for an extensive geophysical and geological survey covering whole state. Information obtained will be accessible to any operator for future exploration.

Standard Oil Co. of New Jersey emphatically denies accusations emanating from Paraguay that it is involved in any way in the war between Paraguay and Bolivia, and aiding Bolivia. Company points to oil operations, through subsidiaries, in both countries.

10

August 4, 1949

First continuous shale-oil refinery, located near Rifle, Colo., completed and goes on stream. Experimental 200-bbl. unit costing $244,900 encounters no difficulty.

Stiffer antitrust laws asked as administration prepares for more intensive drive on big business. Department of Justice proposed to break big corporations into smaller competing units.

Standard Oil Co. of Ohio gets under way on $30,000,000 enlargement and modernization program at Lima, Ohio, refinery.

Salt Lake Pipe Line Co., Standard Oil Co. of California Co. subsidiary, lets contracts for 320-mile, 8-in. products pipeline from Standard's Salt Lake City refinery to Boise City, Idaho.

JOURNALLY SPEAKING

Rewrite the Textbooks

"THROW AWAY your textbooks, son," said the Old Observer. "Nothing you learned in college has any application to the oil business.

"The oil business defies all the laws of economics, the laws of physics, and even the law of gravity."

"You mean," we asked, "like the paradox that during the last 100 years the more oil we've used up the more we have on hand?"

"Oh nothing as simple as that," replied the Old Observer. "That elementary paradox is child's play to explain. I'm thinking of things that are much more strange and wondrous."

"Like for instance?"

"Like for instance the old law of physics that when you cut some off of something it makes it smaller. In the oil business it works just the other way."

"Example, please."

"Look at the oil supply during the first half of 1959. Early in the spring the Government decided it was too big, so it cut some off by curtailing imports. But did that make it smaller? Certainly not. It immediately got bigger by more than the amount that was cut off. See what I mean?"

"I'm beginning to."

"That reverse rule applies to refining, too. Right now there are several big refineries shut down by strikes. This comes at a time when there is a surplus of refined products. Now by all the laws of economics and the rules of reason, in any other industry this would mean that the surplus would be worked down soon. But not in the oil business. The more refineries closed down, the higher the output.

"I don't follow."

"That discloses your ignorance of the oil business, son. Can't you see that as soon as one refinery shuts down, all the rest raise their runs to cop off that fellow's business? By the time the down plants get back on stream the surplus of products will be higher than before."

"Sounds like 'Alice in Wonderland'."

"Blunderland, you mean. Now when you studied economics in school you probably were taught that increased demand for a product will mean that its price will go up. Not so in oil."

"But . . . "

"But nothing. Look at the statistics. Demand for crude oil in this country is higher than it was 2 years ago, but its price is lower. And don't try to say that a lower price stimulated the demand. That might be true for any other commodity, but not for oil.

"And just look at the past 6 months. Demand for gasoline increased 5%, but its refinery price decreased 10%. It wasn't that the lower price caused the increased consumption, but the other way around; the increased demand brought down the price."

"But you're ignoring the supply side of the supply-demand equation."

"Of course I'm ignoring it. Everybody in the oil business ignores it. What I'm trying to get through your thick skull is that those classic old laws of economics don't operate in the oil business. The rule in oil is that supply increases in geometric ratio to an increase in demand. Demand goes up 2%, supply goes up 4%. It works every time."

"But right now, this summer, gasoline prices are stiffening. Isn't that a clear indication that the surplus is being worked off and that supply and demand are coming into balance?"

"You're hopeless," snorted the Old Observer, "Can't you ever shake off those old-fogey notions? It doesn't indicate anything of the kind. Exactly the opposite. A stiffening price for gasoline or any other oil product is a sure-fire sign that there will soon be a bigger surplus than before."

"I would think . . . "

"That's where you make your big mistake. Don't think. Just look at what's always happened in the past. As soon as prices start up, everybody begins to overproduce more than before. It'll happen this time, too. Just wait and see."

"Then you would say that the oil industry's economics is pretty screwy?"

"You had better say that. What I would say about it wouldn't be fit to print in your magazine."

—Henry D. Ralph.

ONE SIMPLE MEANS TO MORE PROFITABLE PRODUCTION

Rod-pumped production strings held in proper tension yield more volume and require fewer workovers. One simple, reliable and low-cost means to this profitable end is the new Baker Tension Tubing Anchor.

It is designed for use where well conditions are relatively stable and where pull-up strain can be readily applied. Under other conditions, Baker Compensating Tubing Anchors that automatically apply and maintain the proper tension are recommended.

The Baker Tension Anchor is mechanically set at the desired depth and the proper tension* applied at the surface. This eliminates harmful "buckling and breathing," normally caused in unanchored strings by the constant movement of the plunger within the pump. As a result, volumetric efficiency will increase and the pump will operate longer. Rod jobs, as well as workovers due to tubing, casing and coupling wear, will be significantly reduced.

The anchor is easily set and released through the use of a simple J-Slot mechanism. Baker field-proved *rocker-type* slip units, which cannot become "stuck or cocked," are utilized to anchor the tubing to the casing. An emergency release assures retrievability.

The Baker Tubing Anchor is simply designed and ruggedly constructed. This combination has a two-fold economy: first, the anchor costs less to buy, and second, maintenance is held to an absolute minimum. Add to this the profits realized from increased production and lower operating expenses, and the value offered by the Baker Tension Tubing Anchor is obvious.

**How much tension do you apply? Baker has published a new Technical Bulletin, Number 357, that answers this question in detail. It also has more facts about the Baker Tension Tubing Anchor. Ask your Baker man for 357, or write: Baker Oil Tools, Inc., P. O. Box 2274 Terminal Annex, Los Angeles 54, California.*

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Why import control is a "failure"

THERE'S a widespread feeling in much of the oil industry that "import control is a flop."

This is an expression of disappointment that imposition of a ceiling on imports did not overnight restore the industry to full health by eliminating surpluses, stiffening prices, and zooming production and drilling rates to new heights.

The fact that import control did not cure all ills makes it necessary to examine the reasons for its "failure."

TOO MUCH OIL is the root of the industry's troubles. More properly stated, the trouble is capacity to produce, refine, and distribute more oil than the market is currently able to absorb.

Imports were just one segment of the surplus. They have now been cut to reasonable dimensions. The failure of this action to do the whole job requires the industry to buckle down to the task of coping with excess capacity for perhaps several years until demand catches up.

Closer attention must be paid to the rate of growth in demand and to factors which cause shifts in pattern of the market and its sources of supply. The output of both crude and products must be tailored to fit.

Tighter proration of crude production is needed to conserve oil in the ground against the day when the nation will need it. States which have no market-demand proration statutes can no longer evade their responsibility to do their part in keeping the industry healthy. Since proration of imports is now national policy, proration of domestic output is an essential corollary.

The prorating states, also, have been too smug. They can do much to make the surplus capacity easier and more equitable to carry by extending the principles of ratable take, protection of correlative rights, unit operation, and other conservation practices.

Operators must redouble efforts to cut costs by eliminating wasteful habits of the free-and-easy boom days—all the way from saving paper clips to not drilling unnecessary wells.

BEFORE IMPORT CONTROL was imposed, industry and government leaders warned repeatedly that imports were not the whole cause of oil's troubles, and that control would not be a panacea.

But so much of the industry was so preoccupied with the imports problem that it paid little heed. It sought remedy in action from Washington alone.

The federal Government has done all that the industry should expect —or permit—it to do in curbing the surplus which has undermined the industry's health. The failure of import control to restore full health simply emphasizes the failure of the industry to keep itself physically fit.

Checking the 4340 nickel alloy steel pipe during drilling of the world's deepest exploratory well — Phillips 1-EE University. The top portion of the string was made up of this 4340 pipe when the well hit 25,340 feet.

World's deepest well completed with the help of nickel alloy steel drill pipe

When Phillips 1-EE University Well reached beyond 23,000 feet, the drilling crew halted operations. At these depths, drill string failure was a dangerous possibility.

The drillers' job was to keep it from happening.

They did it by running in 10,500 feet of nickel alloy steel drill pipe as the top section of the string. Drilling began again, and the well was completed at a world's record 25,340 feet.

National Supply Company, maker of the 3½-inch drill pipe used at the well, names it "Spang P-105". It's made from 4340 nickel-chrome-moly steel, heat-treated to a yield strength of 105,000 pounds per square inch.

Nickel alloy steels long ago proved their dependability in the oil fields where only the best is good enough . . . in rock bit cutters and hole reamers, in fishing taps and slip liners, in pumps and sucker rods.

In your own drilling operations, remember that nickel alloy steel parts are your best insurance against equipment failure.

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View of the Phillips Petroleum Company rig in Pecos County, Texas. Nickel alloy steel drill pipe is in position and ready to be run into the hole.

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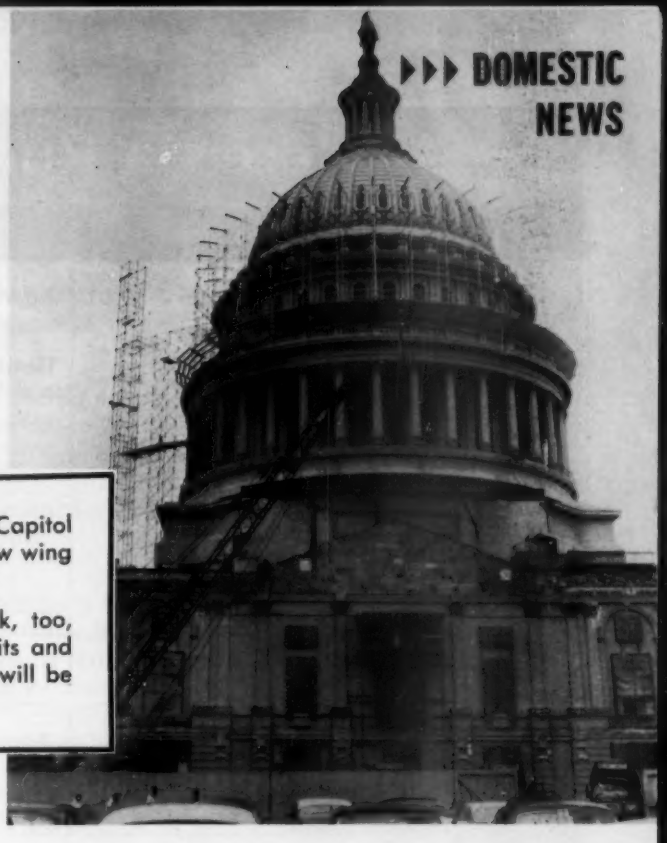
Where Oil Stands Today In Congress



● Workmen on the outside of the nation's Capitol are busy on a $21-million project to add a new wing and strengthen some of the present structure.

Inside the building there's a lot of work, too, before the nation's lawmakers can call it quits and go home. At present it looks as if some of it will be left undone.

Joe Reilly, District Editor

STACKS of bills vitally affecting the petroleum industry are awaiting action as Congress prepares to abandon the scaffold-marred old landmark on Capitol Hill.

Soon, the annual rush toward adjournment will begin. What happens between now and the session's final gavel will mean more to oil men—and citizens generally—than all the debating, trading, and wheel-spinning that has gone on in the Capitol during the past 7 months.

Behind the network of scaffolding, Congress has been patiently grinding out legislation for 29 weeks, with brief intermissions for Easter and a few politically-inspired holidays which have been observed with equal fervor.

Since convening January 7, each house has been in session approximately 110 days, with a "day" often running as little as 2 or 3 hours and frequently with no more than half a dozen congressmen "in session" at one time.

But this does not mean that Congress has been idle. Most of a congressman's work is done when Congress is not in session. It took a lot of home work just to dream up the more than 12,000 bills and resolutions which have been introduced this session. Obviously, it takes a lot more time in committee to debate the bills, hear private citizens' views, amend the measures, and pass them along to the respective houses.

But now, most of the debating is done for this session. In the closing days, bills will fly through with alarming speed. Some will be held over for next session. Some will be killed.

Many oil bills are likely to be held over. During the closing hours of the session, when Congress is intent on going home, there's little time for any bill unless it has top priority. Few oil bills now pending can qualify under that criterion.

About the only thing that can be predicted with confidence about the closing days of the session is that Congress will spend lots of money. While workmen on the outside of the building plod along on the $21-million Capitol-expansion project, Congress will whip through the bulk of a spending program estimated to cost the taxpayer close to $76 billion.

Now, in the calm preceding the adjournment squall, Congress already has dispelled most of the presession misgivings about its attitude toward the oil industry and business generally. Despite the leftward shift brought about by last year's elections, Congress is establishing what its leaders like to call a "responsible" record.

As had been expected, the oil industry has been singled out by Congressional attacks on the depletion rate, foreign operations, marketing practices, and alleged "rebates" from pipeline subsidiaries. In most cases, though, the attacks have come from a few disgruntled congressmen representing a minority view.

Depletion . . . The most publicized attack—against the 27½% depletion rate—fizzled this year. But depletion will remain a heated issue in Congress next year and perhaps for years to come.

Producers will have an opportunity to defend the 27½% rate at hearings, starting in November, before the tax-writing House ways and means committee. Chairman Wilbur Mills (D-Ark.) has announced that the depletion rate will be among the many tax provisions to be reviewed in a study looking toward general overhaul of the federal tax structure.

Mills himself, like most of the committee, is considered a strong advocate of the present rate on domestic production. There has been growing speculation, however, that the rate on foreign production may be singled out for special scrutiny.

Several oil-state congressmen, notably Sen. Ralph Yarborough (D-Tex.), have indicated a desire to reduce or abolish foreign depletion to help domestic producers compete against the big companies with foreign holdings. So far, though, independent producers have presented a nearly solid front against any cut.

Renewal of the depletion attack in the Senate in June resulted in an apparent setback for the liberal wing

Here's a Rundown on Principal

Issue	Provisions	Status	Outlook
Leasing	Increase Alaskan acreage limit	Approved by committees of both houses	Good chance for passage
	Protect innocent parties from lease cancellation	Hearings held in both houses	Favorable
	Combine federal lease-option limit	"	Some opposition
	Extend base period for federal leases from 5 to 10 years	"	Interior version may pass
	Increase minimum rental on public lands to 50 cents per acre	In committee	Gaining support
Taxes	Boost gasoline tax by 1.5 cents per gal.	Alternative sought	Opposition growing
	Graduate depletion from 27½% to 15%	Defeated in Senate 54-21	Another fight ahead
	New oil-import tax	In committee	Little support
Imports	Impose or abolish quotas	Buried in committee	Mandatory program easing pressure
Interstate Oil Compact	Approve 4-year extension	Passed both houses	Congress and Attorney General to watch

that had been seeking to cut the rate. On a roll-call vote, the Senate rejected, 54-21, a bill by Sen. Paul Douglas (D-Ill.) to graduate the rate down from 27½% to 15%.

The anti-depletion bloc lacked 10 votes of matching its 1958 strength. A similar bill, introduced last year by Sen. William Proxmire (D-Wis.), was voted down 58 to 31.

This year's vote obviously did not represent true sentiment against depletion. At least eight other Senators were on record in favor of the Douglas bill, and several more probably would have voted for it if the anti-depletion campaign had been better timed and better organized.

There has been some talk of another effort in the Senate to attach an anti-depletion amendment to a tax bill before Congress goes home this year. But in the rush toward adjournment, a renewed attack would be virtually doomed to failure.

Recommendation of the ways and means committee will be a major factor in determining the strategy to be adopted by the anti-depletion forces in the next session. Their chances of success would be greatly reduced if the committee recommends keeping the present rate. But a contrary recommendation, even in a minority report, would spur them to further activity.

Taxes . . . While there was talk of a general tax cut in the nebulous future —perhaps next year—the oil industry and its customers were singled out as the principal targets for increased revenue this year.

President Eisenhower sought an increase of 1½ cents per gallon in the gasoline tax. The proposal was met early in the session by almost unanimous opposition in Congress.

Last week the House ways and means committee, after considering various compromises, tentatively voted down temporary tax boosts of half a cent and one cent per gallon.

Other compromises may be considered later if Ike stands firm against deficit financing for the highway program.

At the present rate of spending, the highway trust fund—financed principally by motor-fuel taxes—faces a deficit of about $500 million this fiscal year.

The oil industry, like other segments of American business, again witnessed the ease with which Congress can continue so-called temporary taxes. Extension of war-inspired corporate tax rates and excise taxes sailed through Congress this session with hardly a ripple of opposition.

Several proposals have been offered for raising taxes on imported oil and gas, but none of them is given much hope of emerging from committee this year.

Antitrust . . . The stand-pat attitude on Capitol Hill is apparent not only in tax matters, but also in the checking of left-wing pressures for more government intervention in business.

Oil Bills in This Session

Issue	Provisions	Status	Outlook
Antitrust	Limit "good faith" defense against price discrimination charges	On active list in committee	Will be around
	Prior notice of price increases	Gathering dust in committee	Future threat
	Prior notice of mergers	"	"
	Permit subpoena of records for antitrust investigations	Cleared Senate committee	Doubtful
	Federal "fair trade"	Held up in committee	Not this year
Foreign Operations	Tax incentives	Several versions before committee	Not much support in Congress
Natural gas	Reduce federal controls	Lingering before various committees	No resurrection in sight
	Control imports, exports	Before House committee	Potentially hot issue
Pipelines	Let FPC require extension	Waiting for committee action	May be future threat
	Curb dividends from oil lines	Before House committee	Future propaganda threat
Air Pollution	Extend controls on plants, autos	Before various committees	Pressure will increase

Two controversial bills by Sen. Joseph C. O'Mahoney (D-Wyo.) are lingering in committee after causing a brief flurry of excitement earlier in the session. One would require advance notice of price increases by major companies in highly concentrated industries, including the oil industry. The other would require advance notice of proposed corporate mergers.

There's little steam this year behind a pair of perennial bills by Sen. Estes Kefauver (D-Tenn.) and Rep. Wright Patman (D-Tex.). The bills, better known by title than by content, are S. 11 and H. R. 11, the low, identical numbers indicating their seniority if not their prestige in Congress. Their effect would be to limit "good faith" as a defense against charges of price discrimination.

Federal "fair trade" bills also have been in the limelight off and on during the session. They seem to be losing some of their backing, though, and there's a possibility that they will be toned down to exclude marketing of petroleum products.

Natural gas . . . Several variations of the much-maligned Natural Gas Bill have been introduced this session.

Rep. Oren Harris (D-Ark.) toned down his bill this year in an effort to give independent producers a measure of relief from federal price controls. But, in the absence of strong support from the administration, Harris has refused to submit his bill to the public reaction which killed earlier versions.

Another bill to reduce controls on independent producers also was introduced early in the session by Rep. Frank Ikard (D-Tex.). Rep. Bruce Alger (R-Tex.) and Rep. John Williams (D-Miss.) went further to exempt independent producers from the legal red tape that came with the Supreme Court's 1954 decision in the Phillips Petroleum Co. case.

The gas bills, though differing in many respects, have one thing in common. All are buried in committee and have little chance of being resurrected.

Pipelines . . . Also lingering in committee is a counter proposal by Rep. Charles A. Vanik (D-Ohio).

His bill would reverse the Supreme Court's more recent decision in the Memphis case, which upheld the right of a pipeline company to increase its gas rates without advance approval of its customers.

Oil-carrying pipelines face continued threat of more government controls. After the Supreme Court upheld the dividend-computing methods in the Arapahoe case, Rep. Emanuel Celler (D-N. Y.) introduced a bill to curtail dividends to shipper-owners.

The Supreme Court's ruling in the Arapahoe case and Celler's bill both came soon after Celler himself issued the highly controversial subcommittee report on an investigation of the 1941 pipeline consent decree. This decree, still in effect, permits shipper-

owners to collect annual dividends amounting to 7% of the valuation of their pipeline property. Celler and three fellow Democrats on the House antitrust subcommittee interpreted dividends to shipper-owners as "rebates."

Divorcement . . . Neither the subcommittee report nor Celler's bill is considered much immediate threat to the industry. But they raise the possibility of future action to divorce pipelines from the producing end of the business.

The same threat was implicit in the Attorney General's last annual report on activities under the Interstate Compact to Conserve Oil and Gas. In approving extension of the compact this session, Congress provided for continuation of the annual reports by the Attorney General.

Leasing . . . Committees of both houses have cleared compromise bills to increase the acreage limit on federal mineral leases and options in Alaska.

Originally calling for a limit of 1,000,000 acres, the bills have been amended to set the total at 600,000 acres which any company or individual may hold in the new state. They draw no distinction between leases and options and in effect double the 100,000-acre limit on leases and 200,000-acre limit on options provided by present law.

Sen. O'Mahoney's bill to combine the limit on leases and options in all states except Alaska and Hawaii drew the surprising opposition of Sen. Clinton P. Anderson (D-N. M.), who sat in for the ailing O'Mahoney as acting chairman at subcommittee hearings. Under present law, an operator may hold leases on up to 46,080 acres of public lands in any state except Alaska. The option limit of 200,000 acres outside Alaska would remain in effect under the O'Mahoney bill, although the combined limit of 246,080 acres would apply to leases or leases and options combined.

Less controversial sections of the O'Mahoney bill would increase the base period of federal leases from 5 to 10 years and protect innocent leaseholders from cancellation proceedings based on alleged fraud by the original lessees. Interior would go along with these provisions, although the department favors extending the base period only on non-competitive leases.

Partly to offset objections to other changes in the leasing act, Anderson has introduced a bill to set the minimum rental on federal leases at 50 cents per acre annually.

watching WASHINGTON

Joe Reilly

• Foes of depletion may gain at polls . . .

THE FIGHT OVER OIL and gas depletion allowance may erupt with new vigor after the 1960 elections.

Twenty-two senators who voted against the Douglas depletion-cutting bill this year are subject to reelection next year. Already, some of them are conceded to face an uphill fight to retain their seats.

Further darkening the outlook is the fact that terms are about to expire for only five senators who voted for the Douglas bill.

Of the 33 senators whose terms expire in 1961, there are 22 Democrats and 11 Republicans.

All but three of the Republicans facing reelection voted against the Douglas bill, which called for a graduated depletion rate ranging from the present 27½% down to 15%.

Of the anti-Douglas Republicans, Styles Bridges of New Hampshire, John S. Cooper of Kentucky, and Henry Dworshak of Idaho are the only ones whose seats are not considered in special danger.

REPUBLICANS THEMSELVES are expressing concern over the reelection prospects of the other GOP senators who voted to retain the present 27½% depletion rate. In this group are Gordon Allott of Colorado, Carl T. Curtis of Nebraska, Thomas E. Martin of Iowa, Karl E. Mundt of South Dakota, Leverett Saltonstall of Massachusetts, and Andrew Schoeppel of Kansas.

The two Republicans up for reelection who voted with Douglas are Clifford Case of New Jersey and Margaret Smith of Maine. Neither appears to be in much trouble back home, according to the GOP pulse-takers.

Democrats in the antidepletion bloc whose terms are about to expire include the ring-leader, Paul Douglas of Illinois, in addition to Estes Kefauver of Tennessee, and Richard Neuberger of Oregon.

Five other Democrats whose terms are expiring also have past records in opposition to the present depletion rate, although they did not vote with Douglas this year. In this category are 91-year-old Theodore Green of Rhode Island, who is not expected to seek another term; Hubert Humphrey of Minnesota, who is spending more time seeking the presidency than reelection to the Senate; Everett Jordan of North Carolina, who has been on both sides of the fence; Pat McNamara of Michigan; and Joseph C. O'Mahoney of Wyoming, now partially immobilized by a stroke.

James E. Murray (D-Mont.), whose term also is expiring, is on record against the Douglas bill although he did not vote this year. Most of the 14 other anti-Douglas bill Democrats up for reelection likely will win.

ALTHOUGH THE DOUGLAS BILL was voted down 54 to 21 this summer, there are at least 34 present senators who at one time or another have gone on record in favor of a depletion cut. The margin could be narrowed considerably if there's any large turnover in the 22 "pro-depletion seats" which will be at stake in 1960.

Adding to the threat is the possibility of an antidepletion man's election to the presidency next year.

Three of the top contenders for the Democratic nomination have voted against the 27½% rate in the Senate. Majority Leader Lyndon B. Johnson of Texas is the only Democratic senator now being prominently mentioned for the nomination who has consistently supported the present rate.

John Kennedy of Massachusetts missed this year's vote. Last year he voted for the Proxmire bill calling for a graduated depletion rate but voted against the Williams amendment to reduce the rate to a flat 15%.

Humphrey voted for both depletion amendments last year and indicated he would have supported the Douglas bill this year if he had been present and voting.

Stuart Symington of Missouri has three straight votes for a depletion cut.

Refinery Strikes Spread

. . . to Indiana Standard's Whiting plant. Fight over new work rules now has idled 5.5% of U. S. refining capacity.

THE STRUGGLE between labor and Standard Oil Co. (Ind.) over work rules assumed showdown proportions last week when an independent union struck the company's big Whiting refinery.

The Whiting walkout in one swoop idled about 5,000 men and shut down 220,000 bbl. daily of processing capacity.

With Whiting added to three previous shutdowns in the Indiana Standard family, the industry totaled up these results:

. . . **7,383 workers** off their jobs.

Besides the 5,000 men out at Whiting, 760 are idle at Sugar Creek, Mo., 1,250 at Texas City, Tex., and 373 at El Dorado, Ark. The Texas City and El Dorado plants are operated by American Oil Co., an Indiana Standard subsidiary.

. . . **496,000 bbl. daily** of refining capacity idled.

This is about 5.5% of the nation's 9,130,000-bbl. daily refining capacity.

. . . **Market repercussions** are being felt over a wide area.

Indiana Standard has halted or reduced sharply its crude-buying activities throughout 14 states. This means a financial blow to crude producers already plagued by cutbacks in efforts to balance an oversupply.

The company also is arranging to buy gasoline from other refiners to meet its marketing needs. This should strengthen a gasoline market in the Mid-Continent and Gulf Coast which already had begun to tighten up.

. . . **A familiar issue** has dominated all the negotiations. It is control over plant manning.

The fight has become critical this year probably because of the spread of automation in the nation's refining plants. Labor, as a result, is determined to protect as many jobs as it can. Management is determined to have a union contract giving it more control over job classification, plant manning and assignments.

Whiting trouble . . . The Independent Petroleum Workers of America, Local 1, representing mainly operating and maintenance employes, called the Whiting strike last Tuesday.

The plant was brought down orderly Sunday and Monday. Supervisors continued to maintain utilities and pumps that furnish water to the plant and the city of Whiting. Clerks, chemists, and engineers, some of whom are represented by other unions, continued working.

Whether supervisors will start up any of the processing units and operate them still is undecided.

Ralph Flusche, president of the local union, said bargaining broke down "because management refused to consider any single item proposed by the union." Negotiations have been in progress since early March.

The union sought a 36-hour work week instead of the present 40-hour week without a pay cut. It also asked some changes in fringe benefits. But the issue which broke up negotiations was the union's request for guarantees against layoffs during the contract period.

Refinery Manager Arthur F. Endres said the company offered some wage and salary classification improvements and adjustments.

Joseph P. Sullivan, chief negotiator for the refinery, in a letter mailed to employes, explained the main issue. He said "no management can guarantee jobs for its employes."

"Management cannot see with accuracy what the demand for its products will be down the road nor can it predict with accuracy other factors which have a bearing on the assignment of manpower," he said.

The company did propose that if more than 200 employes were laid off during the contract the union could reopen and negotiate on hours and wages. This later was cut to 50 employes. The union refused to agree to either.

Other stalemates . . . The strikes at Sugar Creek and Texas City featured legal and publicity maneuverings during the week with no signs of a break.

Indiana Standard obtained a court order against mass picketing at Sugar Creek after a group of women camped on a street outside the refinery. Clerical employes stayed away from work a few days to avoid trouble with the pickets.

Charges also flew on both sides. OCAW Local President K. W. Kleihauer accused Indiana Standard of trying to break the union. Sugar Creek refinery Manager P. C. Livesay promptly termed the charge false.

At Texas City, plant Manager B. F. Babin called on OCAW leaders to name a date for resuming negotiations. Union officials had written American Oil offering to resume talks whenever the company is prepared to "meet union demands." Babin replied the company couldn't bargain away its responsibility to manage the plant but was willing to resume talks.

Negotiations in the month-old El Dorado strike broke off again during the week without any progress.

Alberta Production to Gain

. . . in August despite U. S. cutback in exports. Survey sees 1959 Canadian output record of 520,000 bbl. daily.

ALBERTA oil producers will step up their output by 23,012 bbl. daily in August despite cutbacks in exports to the United States.

Nominations filed with the Alberta Oil and Gas Conservation Board indicate August production will average 355,300 bbl. daily, compared with July production of 332,287 bbl. daily.

Canadian refineries will take 287,600 bbl. daily of Alberta light crude, a gain of 42,613 bbl. Ontario refiners will increase their purchases the most, taking 138,440 bbl. daily, or 50,340 bbl. daily more than in July. Other nominations: Alberta, 50,400 bbl. daily, off 2,130 bbl.; Saskatchewan, 53,220 bbl., off 11,145 bbl.; Manitoba, 2,935 bbl., off 6,527 bbl.; British Columbia, 42,605 bbl., off 11,215 bbl.

Exports to the United States will average 54,900 bbl. daily during August. The Puget Sound area will take 52,200 bbl. daily, off 11,800 bbl. from July, and the U. S. Midwest will get 2,600 bbl., a drop of 6,500 bbl.

Outlook good . . . Canada's oil production for the year may reach a record average of 520,000 bbl. daily, a new industry survey predicts.

The forecast calls for a 20% increase over 1958, based on a very strong second-half showing. The survey reported first-half production averaged 503,000 bbl. daily, a 12% gain over the same period last year.

Consumption of crude during the first 6 months in Canada was about 750,000 bbl. daily, 250,000 bbl. daily greater than production.

THE SCOUT CHECK, a long-established oil institution, is undergoing serious scrutiny as some executives ask . . .

Is the Scout Check Now Obsolete?

• A sharp overhaul of the entire scouting system is being talked throughout the industry. In the Rockies, there's a big change coming this fall. In other parts of the country, too, new plans are developing.

Merle Blakely
District Editor

"IT'S SILLY to have intelligent, experienced scouts doing clerical work when they could really be doing scouting."

That comment from the chief scout of a major company sums up a growing attitude that is leading to some big changes in scouting practices.

Not everyone is convinced a big change is needed. In fact, the skeptics now outnumber those who've caught the missionary zeal.

But the eyes of all scouts and many executives will be on the Rocky Mountains this fall as a commercial organization for the first time moves into the field now occupied exclusively by scouts.

Petroleum Information, Inc., an alert and growing oil-reporting firm, on October 1 will take over the data-collecting and other routine work done by scouts and will provide a "well record" service for companies in the area.

It already has signed up seven companies—at $30,000 a year each—and others are seriously considering the plan. Representatives of the seven companies will meet August 5 in Denver to activate the plan.

The Petroleum Information project isn't a brand new idea.

It's been proposed before in the Mid-Continent, where a committee representing 27 companies for many months has been looking at the need for streamlining scouting methods. Until now, no commercial firm in this area has succeeded in signing enough oil companies to guarantee the project.

But if the Rocky Mountain undertaking succeeds, the pressure will increase for giving a new look to scouting practices in other parts of the country.

The object: Greater efficiency, faster reporting, less cost.

What's behind it? . . . Scouting originated soon after discovery of the Drake well. Even then, operators sensed that information from the rig floor had tremendous value.

Barbed-wire fences and shotgun guards, as instruments to aid companies in shielding important information, were scouting hazards in other years.

Heeding demands of economics and sound business practices, the scout checks were formed in the 1920's. Duplication of effort was eliminated, routine information was swapped in weekly sessions. Since then, checks have been key sources for volumes of routine, pertinent information.

In 1924, the National Oil Scouts and Landmen's Association was formed. One of it's chief functions is publication of an annual review of geological and geophysical prospects, land and leasing activity, wildcat exploration, proven field development, oil and gas production and pipeline and refining statistics.

Scout checks grew, more areas were covered, more companies participated, more time of more scouts was taken to serve the check meets.

They became more time-consuming. Quality of data did not keep pace with increased costs. Material flowing from the scout checks was not proportionately valuable to time taken for attendance, assembling and distribution of information. Reporting serv-

What's Involved in the Rocky Mountain Plan

Petroleum Information is offering detailed scouting services in the Rocky Mountain area for a $2,500 monthly fee per company. Contracts are for a minimum of 1 year.

Seven companies have subscribed to the service for the first year. They are:

Shell Oil Co., Sun Oil Co., Pure Oil Co., Ohio Oil Co., Pan American Petroleum Corp., Continental Oil Co., and Carter Oil Co.

PI's affiliate which will handle the scouting program will be known as Well Record Service.

If companies prefer subscribing for reports on individual areas in the Rocky Mountain region, the monthly fees are:

North and South Dakota	$400
Wyoming	700
Montana	400
Eastern Colorado, western Nebraska and southeastern Wyoming	700
Northwestern Colorado and northern Utah	400
Southwestern Colorado and southern Utah	500

The subscribing companies will be furnished the following data:

1. A daily morning report on important wildcats.
2. New location notices.
3. A weekly drilling status report listing data on all active wells.
4. A consolidated completion report with detail on each completed well.
5. Supplemental notices covering workovers, deepenings, abandonments.

How it works . . . Well Record Service will have its own staff of scouts, record clerks, and tabulators.

Field men will use cars equipped with radio telephone and will visit wells where current reports are not being obtained. Daily contact with district and division offices for wildcat well data and not less than weekly contacts for development wells is planned.

Field checks will be made regularly of wildcat wells, whether or not current material is already on hand by participating companies. The purpose of this double check, Well Record Service says, is to obtain rig floor data which might otherwise be overlooked, particularly as to coring, testing and some types of field work.

An industry advisory committee, made up of one representative of each subscribing company, will meet at regular intervals with PI representatives to recommend rules and regulations, standardization of forms, procedural and organizational functions.

The service will be cooperative. Companies will make available data on their own operations for distribution to other clients. In case of a "tight hole," the company withholding information must announce the "tight" classification. This announcement also indicates when the information might be released.

Material will be sent to clients by TWX, telegraph, airmail, and regular mail depending on timeliness and interest. It will be sent to two offices of a company, at the company's direction.

ices took some of the edge off the scout check stature by furnishing related information at less cost.

Problem pried open . . . A committee in Oklahoma at management level tackled the problem on a frank no-holds-barred basis. Representatives of 27 companies, all supporting checks and with scouting programs, got together.

Some definitely felt scout checks had deteriorated. Others said the checks had outlived their usefulness. The checks had strong defenders, too. The committee's main premise was that scouting today is not efficiently handled, that some operations waste time and skills, and that there is needless duplication.

A sub-committee of three was named to inquire into scouting practices and to make recommendations. Members are A. L. Repecka, Superior Oil Co., Oklahoma City, chairman; John Cram, Continental Oil Co., Oklahoma City, and J. H. Torbett, Skelly Oil Co., Oklahoma City.

Pay dirt was found fast. As a result of preliminary studies, scout checks in Oklahoma were reduced from three to one. The present check at Oklahoma City costs about $250,000 a year to operate. This is a saving from the estimated $350,000 to $500,000 for the three checks formerly held at Ardmore, Shawnee, and Enid.

Studies indicated there was no loss in quality or quantity of information when the three checks were consolidated into one. The present check takes just about the full time of one scout per company. The shift, however, freed other scouts for more important work.

Data buying screened . . . Word spread fast. Two firm proposals for supplying scouting information for flat fees were given the committee.

One was by Petroleum Information serving the Rocky Mountain area. The other was by a service company, which proposed to establish a subsidiary to do reporting work exclusively in Oklahoma. Petroleum Information is now set to kick off the first such specific reporting service in history.

The Oklahoma proposal still is very much alive. Verbal "commitments" of nine companies have been reported but a minimum of 15 is considered necessary to crank it up. Costs of the services are not too far apart. The Oklahoma company offers data for a $1,075 monthly fee.

Informal proposals reportedly have been made to participants in the Amarillo and Midland, Tex., checks but the presentations appear not too far advanced. The Midland check may be the world's largest. This West Texas group has about 110 members and owns its own building.

Why a change? . . . Those leaning to the swing away from the scout check system state flatly it will release good scouts to do more important work for companies. They see several benefits:

. . . It will relieve scouts of clerical work. As one land man puts it "a scout isn't a clerk and he shouldn't be." He adds that if a good scout is required to spend 40 to 60% of his time in paper work, his company is losing one-half his scouting effectiveness.

. . . It will lead to a standardization in scouting reports. The servicing companies will prepare records on recommendation of company committees, so duplicating and filing time will be saved.

. . . More frequent reports will be possible from the commercial agency. Daily reports by telegraph on key wells and important field developments are promised. The free lance scouts can take this information and supplement and refine it to company advantage and requirements.

The vice-president and exploration manager of one company says use of

outside services "will increase the overall scouting effort of our company."

Director of another company predicts the eventual end of scout checks, as they now operate.

"The idea of buying scouting reports is sound and logical," he says. "It is just as reasonable and feasible to get our information this way as it is for us to hire service companies to cement a well. Our scouting procedures haven't kept pace and it's time for an about face."

Why some oppose . . . The opportunity to cross-examine other scouts at a check meeting is eliminated in the service system.

There are some who believe this may affect the quality of data supplied. Digging for more detail now is a part of every scout-check session.

Leaders of the scouting fraternity incline to the opinion that a junking of the scout check could dump overboard the very pulse of a long-established system of cooperative exchange and distribution of oil information.

The outlook . . . Those who favor shifting scouting responsibilities believe it would cut the number of scouts very little, if any.

The commercial services will expand their staffs with competent scouts. There are about 1,100 active scouts in the U. S. and Canada and another 800 are listed as associate members of scouting organizations.

Name of the National Oil Scouts and Landmen's Association has been changed to International Oil Scouts Association. W. J. Garrison, Houston, Humble Oil & Refining Co., has been elected the 1960 president. Individual and collective appraisals by members of this group will have an important bearing on scouting's future.

A few members have stated frankly they think professional standards of scouting may be increased by use of commercial service.

While the seven companies buying services in the Rocky Mountain area numerically may not represent a majority of companies with scouts in the checks there, their withdrawal from participation could result in discontinuance of these meetings.

Another possibility is that members of the check not initially buying the blanket scouting service may subscribe to service for limited areas only with fees reduced accordingly.

The entire industry will keep a weather eye on operation of the scouting-for-hire project.

Definitely, a broad new pattern for industry scouting is in the making.

Texas' Rule 37 Still Invincible

. . . despite repeated attacks by companies hoping to get production related to the amount of oil under a property.

WHO'LL WIN Texas' war over small-tract drilling, nobody knows. But the small-tract drillers last week were still winning the battles.

They continue their long, uninterrupted winning streak with these developments:

. . . **In Emperor field** of Winkler County, Pan American Petroleum Corp. lost a suit challenging the allocation formula of two-thirds acreage and one-third well.

The field has a 320-acre spacing pattern. At issue was a dual gas well drilled by W. A. Moncrief, Jr., Fort Worth, on a 5-acre tract. A district judge in Austin ruled that Pan Am had waited too long to file the suit.

In a companion suit the court also ruled against Pan Am. Pan Am was contesting a Railroad Commission order requiring ratable take from all wells according to the allocation formula.

. . . **In Port Acres field** of Jefferson County the Railroad Commission denied motions by Michel T. Halbouty et al. for a rehearing on the allocation formula set in April for the lower Hackberry reservoir.

The ruling follows closely a decision by the Austin appellate court rejecting Halbouty's appeal for cancellation of a drilling permit granted W. G. Darsey, Jr., to drill a $300,000 gas well on a 0.48-acre tract (OGJ, July 27, p. 115).

. . . **In Alta Loma field** of Galveston County the commission reaffirmed its gas-field allocation formula of two-thirds acreage and one-third well.

Hassie Hunt Trust Estate, Phillips Petroleum Co., and others asked the commission to base allocations more strongly on acreage in setting field rules. In this 320-acre spacing field there also is a small-tract well—a Coastal States Gas Producing Co. 10,000-ft. well drilled on a ½-acre lease.

The dispute . . . In all small-tract cases, the plaintiffs contend that the small-tract wells will drain gas from other properties.

This, they say, penalizes adjoining operators, royalty owners and landowners and gives the small-tract operator thousands of dollars worth of gas to which he is not entitled.

In all cases so far they have been unsuccessful, whether fighting to bar small-tract wells from being drilled or to obtain an allocation formula which would come closer to limiting production from such wells more closely to the amount of gas actually under the lease.

PIPELINE BRIEFS . . .

Contract to lay 39 miles of 36-in. and 2½ miles of 30-in. in New Jersey for Transcontinental has been awarded to H. C. Price Co., which has already coated the 39-mile line under a separate contract. The 36-in. will be laid from Clifton to Centerville, and the 30-in. in Hunterdon County.

A 25-mile 4-in. line to connect the Parkman Mississippian oil pool in Southeast Saskatchewan is planned by Producers Pipelines, Ltd. Permission is being sought from the Saskatchewan Government to lay the line this fall.

A 152-mile 6-in. products line from Artesia, N. M., to El Paso, Tex., will be laid by R. H. Fulton & Co., Lubbock, Tex., for Continental Pipe Line. Construction is getting under way on the line, which will link with Southern Pacific and Standard of Texas products lines at El Paso.

Contract for 15 miles of 10 and 12-in. in Kleberg and Nueces counties, South Texas, has been awarded to O. R. Burden Construction Corp., Tulsa. The job will be laid for Humble Oil & Refining Co.

Construction has started on 31 miles of 12-in. and 6 miles of 24-in. for Houston Pipe Line Co. near Beaumont. The job is under contract to Houston Contracting Co.

A 130-mile 12-in. line is planned by Peace River Oil Pipe Line Co. from Virginia Hills through Windfall to connect with its main line linking with Trans Mountain Oil Pipe Line in Alberta. The company is seeking government permission for a line with ultimate capacity of 45,000 bbl. daily.

Humble Planning New 44-Story Home Office

• South's tallest building will occupy square block in Houston's downtown area.

HUMBLE Oil & Refining Co. will pull its scattered Houston family under one roof when it constructs a $32-million, 44-story building.

The structure will occupy a square block just three blocks south and one west of the present crowded Humble building in downtown Houston. The planned structure will be the tallest office building in the south.

It will be a rectangular tower, 225 ft. by 115 ft., facing north on Bell Street between Travis and Milam.

Welton Becket & Associates of Los Angeles is the architectural and engineering firm for the project.

The building will include a cafeteria for 1,200 persons, a 500-seat auditorium, lounges, and space for shops.

A 1,300-car garage on an adjacent block to the southwest also will be built with an underground passage to the main building.

Working drawings and specifications will be completed by next January. Construction will take nearly 2 years.

Humble's 3,300 Houston employes now work in seven buildings, some of which are more than 4 miles from the main downtown building.

An idea of how the building will change the Houston skyline is given above where a drawing of the proposed building is superimposed on an aerial photograph of downtown area.

HUMBLE'S new home will tower above the Houston skyline as this photographic montage shows. The 44-story rectangular building will face downtown Houston and overlook a plaza. Note the garage across the street. It also will occupy a square block and is to be connected with the building by an underground passage.

Gathering-line extensions totaling 34 miles will be made by Pembina Pipe Line, Ltd., in Alberta between now and November. Contracts for 20 miles of 3-in., 10 miles of 4-in., and 4 miles of 6-in. have been awarded to Mannix, Ltd.

A 35-mile 60-in. steel water line will be laid by Morrison-Knudsen Co., Inc., near Birmingham, Ala. The line will be laid for the Industrial Water Board of Birmingham.

A 37-mile gathering line and a 50-well development program are planned by Lone Star Gas Co. and Coastal States Gas Producing Co. in Brown, Eastland, Comanche, and Erath counties, North Texas. Lone Star will purchase the gas production from the Coastal States properties, which are estimated to have reserves of over 267 billion cubic feet of gas and 4 million barrels of condensate.

Lone Star also will advance to Coastal States $15,000 per well toward the cost of 50 wells, to be repaid from one-quarter of the gross proceeds of the wells. Gas deliveries under a 20-year contract are expected to start in May or June of 1960.

A new pipeline outlet for Southeast Stockholm and North Buffalo fields, Harper County, Oklahoma, will start operating this week. The 45-mile 6 and 8-in. line runs from the Laverne, Okla., gasoline plant operated by Sun Oil Co. to the fields and then to Jayhawk Pipeline at the Harper Ranch, Kans., station. Wheat Belt Pipe Line Co. will operate the new line for its parent company, Cameron Crude Oil, Tulsa.

Some 160 miles of pipeline will be laid by the Pittsburgh Group Companies of the Columbia Gas System during the last half of this year. The companies include Manufacturers Light & Heat, Cumberland & Allegheny Gas, and Home Gas Co.

Also for Pipeliners...

IN THE NEWS: Bills affecting natural gas and pipelines are among those hanging in committee in Congress and expected to hold over until next session (p. 39) . . . Revised plan for Canadian gas imports faces FPC delay (p. 56) . . . Gas-industry construction spending is rising to a new record this year (p. 60) . . . Aramco is trying to attract industry to Saudi Arabia. Its lure is cheap gas (p. 61).

A complete list of pipeline projects is carried in the last issue of each month. Current projects are carried in Pipeline Briefs.

PLUS THESE TECHNICAL REPORTS: Dual-beam microwave system gives near perfect reliability (p. 89) . . . Rubber balls clear water from line (p. 112).

Dr. B. B. Weatherby Gives

The geophysics profession has experienced some lean times during the current drop off in exploration activity in this country.

Geophysical crews have been idled. Geophysicists have lost their jobs. Like geologists, they have had trouble getting new work.

For an appraisal of what is happening, The Oil and Gas Journal asked Dr. B. B. Weatherby, senior vice president of Amerada Petroleum Corp. He conferred with his associates in the profession in giving answers.

Q. Severe unemployment exists in the ranks of geologists. Does the same situation exist for geophysicists?

A. Yes. many geophysicists and allied technicians are out of jobs, especially in this country. The technicians and the less experienced geophysicists are the hardest hit. I doubt that very many experienced and really top-flight geophysicists remain out of work very long.

Q. What is the cause of the unemployment?

A. It comes from a considerable decline in the amount of geophysical activity in the United States and Canada. The result, naturally, is loss of jobs for crews.

This would have been worse except for one development: A large increase in foreign exploration. This has meant jobs for American geophysicists and has taken up a great deal of the slack in the domestic market for their labors.

Q. Can you give some specific indication of how severe the drop in geophysical activity has been in the U. S.?

A. The latest study by the Society of Exploration Geophysicists (OGJ, June 8, p. 118) gives the statistics. In 1958 the crew-months of geophysical activity on seismic work dropped 1,219. On gravity work, they dropped 267, and on magnetic work they dropped 25. This was an over-all domestic decline of nearly 21% from 1957 activity.

Activity stepped up in South America, Africa, and the Middle East. But since nearly half of the seismic work and 33% of the gravity prospecting are done in the U. S., the drop off in this area resulted in a 7.7% decline in worldwide geophysical work.

Q. Has this spurt in foreign work helped geophysicists more than the geologists?

A. Generally it has. Most American oil companies doing prospecting abroad in the first phase of their exploration send in geological crews for surface reconnaissance. When this job is completed, the demand for geological services drops sharply.

Q. What is the demand for geophysicists?

A. The geophysical crews come in after the initial surface work. There will be usually some geophysical work on the concession from then on until exploration is halted. Most companies abroad use contract crews and have their own staff geophysicists supervise and check the work.

Q. What's behind the drop off in domestic exploration and geophysical activity?

A. There are two main factors. The cost of finding oil has gone up considerably over the past few years as old areas have been combed repeatedly with the pickings becoming more slim all the time. In addition, the industry has built up such a large closed-in productive capacity that continuing to add to it at the present time is of questionable merit. This has led a great many companies to what appears to be the greener pastures abroad.

Q. You mean there's little merit or profit in reworking the older oil-producing areas?

A. By reworking I mean chiefly new seismic shooting. There's still many possibilities in applying the newer geophysical techniques and equipment to recordings made some years ago.

Q. Isn't one of the lures of foreign work the chance of hitting a big strike?

A. Oil men now feel that most of the flush fields of the future will be found abroad.

Q. What's the outlook that work will continue good abroad?

A. It's not likely to drop for some time due to the work obligations contained in the concession terms.

Rundown on Outlook for Geophysicists

Dr. Weatherby, from his experience as a teacher of geophysics, author, and executive of a major oil company, is well suited to speak on the troubles facing his profession.

He received his bachelor and master of arts degrees from Haverford College and his Ph. D. from the University of Pennsylvania. Dr. Weatherby later taught geophysics at Lafayette College, the University of Toledo, and the University of Pennsylvania. He joined Amerada and its affiliated Geophysical Research Corp. in 1925.

Dr. Weatherby has been quite active in scientific societies. He has served as associate editor of the American Association of Petroleum Geologists (1932) and as editor (1934) and president (1935) of SEG. He also is a member of the American Physical Society, AIME, and the American Geophysical Union.

This interview on troubles of geophysicists follows a similar discussion last week with Dr. A. I. Levorsen on problems facing geologists. The answers of Dr. Weatherby follow.

Q. Now back to the domestic scene—what's the outlook at home?

A. It would not be surprising if there was a still further decline in domestic activity.

Q. Can you say what this will mean to the geophysicist?

A. That's simple—competition will be fierce for jobs. The result, I think, will be that the less competent will seek employment in other fields.

Q. Is this good or bad for the industry?

A. The general effect will be to upgrade the personnel engaged in exploratory work which will be beneficial to the industry, although it may mean many personal hardships.

Q. What does this mean for students looking at geophysics as a life work?

A. The absence of recruiters for geologists and geophysicists on the college campus will cause undergraduates to take a more realistic view of their value to the industry and to society. It also will lead to higher quality work both on the part of the colleges and the undergraduates and perhaps persuade a greater number to take advanced training.

Q. What is the advantage of advanced training?

A. Most of the newer techniques in geophysics are more complicated and require an even broader knowledge of the basic sciences such as physics and mathematics. To the extent that these are emphasized, the colleges will turn out competent graduates who are capable of entering other fields if this becomes necessary.

Q. You mentioned the newer techniques. What are these?

A. Nearly all of our new tools tie in with the magnetic recorder. This allows the interpreter to play back the recordings at his leisure. I'll mention one new tool specifically because it illustrates the future possibilities in old areas I talked about earlier. It's the Seisverter which can put on magnetic tape the records from old shootings. This allows all the modern techniques of interpretation to be applied to the old records—it's nearly the same as reshooting the area with modern methods.

Q. What are some other fields which might attract geophysicists?

A. Right now geophysics is enjoying growing popularity in the mining industry. It also is helping the search for new supplies of groundwater. At the next SEG convention a special group of papers will be given on the aspects of geophysics in mining.

Q. Is any new training needed for a geophysicist to switch from oil work to mining work?

A. That depends on the training and educational background of each individual. A person who is very capable and well trained in physics and math could make the switch with comparatively little new training.

Q. What qualifications must a young man have to advance in the geophysical profession? What price must he pay for success?

A. As I said before, he will be lost without a wide knowledge of physics, math, and the earth sciences. He must be willing to work hard and find in his work his prime interest.

Q. Is the outlook all gloomy for exploration?

A. Not at all. As long as the United States continues to produce better than 6,000,000 bbl. of oil per day, it will be necessary for the industry to carry on a very substantial exploratory program to prevent our reserves from suffering a severe decline.

Consequently, there is no need to be pessimistic about the future.

But it may be some time before our exploration personnel will enjoy the same peak of prosperity as they did a decade ago.

New Texas Gas Tax Near

. . . as senate finally approves house proposal for a 1.5% "severance beneficiary" tax on natural-gas production.

THE TEXAS Senate approved a $92,000,000 yearly tax bill late last week which includes a "severance beneficiary" tax on natural gas at a rate of 1.5% of value.

The tax would raise an estimated $7,800,000 a year or $15,600,000 over the biennium. It would go into effect this fall provided the House accepts some changes and additions in its bill and the governor signs it.

Some sources question constitutionality of the severance beneficiary tax, thus perhaps opening the way to a repeat of the long court battle which followed passage by the legislature in 1951 of a similar gas tax aimed at long-line transmission companies.

The legislature now is in its third special session.

Throughout the many months of legislative wrangling, the two houses have deadlocked generally over the issue of business versus sales taxes and, so far as gas is concerned, over whether the gas-production tax should be hiked or the new severance beneficiary tax imposed.

Who would be hit . . . The bill was approved by the senate state affairs committee with some adjustments early last week.

The changes were made to increase the total amount of revenue provided in the house bill.

For the first time, the committee did not delete the beneficiary tax in favor of a hike in the gas production tax. The bill reached the Senate floor July 29 and the experts were predicting the Senate would accept the tax.

The new gas tax as defined in the bill is a "tax on the occupation or privilege of obtaining the production of 'dedicated gas' . . ."

If the producer sells his gas under contract to someone else, that someone else is the beneficiary. This in most cases means the pipelines. But it also will affect utilities and industrial firms.

Tax at wellhead . . . The bill prohibits the "severance beneficiary" from deducting, charging, or collecting the tax from his payments to the producer and specificially bans contracts permitting this.

It provides that the tax shall be applied at the wellhead except where liquids are later extracted and then on the value of the remaining residue gas.

It exempts gas reinjected, lawfully vented or flared, used for gas lift, consumed in lease operations, consumed as plant fuel or lost in extraction of liquids, and that used in connection with irrigation.

In a humorous oversight, the bill as redrafted included one amendment to exempt methane and ethane components of natural gas from the tax. Since methane and ethane are the prime components of natural gas, this amendment would have in effect exempted all gas from the tax. This amendment is to be "amended."

Another committee-added amendment provides that, if the bill should prove partly unconstitutional, as on interstate pipelines, it should fall in its entirety.

INDUSTRY BRIEFS . . .

Sun Oil Co. last week moved its big Southwest division office into new quarters in the new 42-story Southland Tower building in Dallas. The move involves 520 Sun employes who together direct oil and gas production from the mid-South to New Mexico and from the Rio Grande to the Texas and Oklahoma panhandles. The division also carries on leasing and exploration from the Atlantic to and including Arizona. Sun's Dallas division office also is the home of several departments which serve all of the company's six domestic producing divisions covering the United States and western Canada. These include the auditing, industrial relations, insurance, public relations, purchasing, and safety and tax departments.

A $3,000 grant to support research projects in chemical and mechanical engineering at Lehigh University, Bethlehem, Pa., has been made by Du Pont. Dr. Fazil Erdogan, assistant professor of mechanical engineering, will direct the mechanical engineering work, and Dr. Curtis W. Clump, assistant professor of chemical engineering, will handle the chemical project.

A new asphalt terminal under construction at North Charleroi, Pa., on the Monongahela River, has been purchased by American Gil Co. from Mon Valley Enterprises. It has 11 tanks with storage capacity of 3,000,000 gal. of asphalt and will be operating by mid-August.

Bids for construction of a new building to house the Arkansas Oil & Gas Commission offices in El Dorado will be received August 20. The one-story brick structure was authorized by the last Arkansas legislature. It will be financed by the commission with funds from permit fees and the ¼-cent per barrel tax on crude oil.

The exploration, production, and research departments of Vickers Petroleum, Wichita, have been transferred to Denver. President J. A. Vickers' headquarters also will be Denver. Other departments will remain in Wichita. A new office building will be built in Wichita to house the general offices there.

White Eagle Oil Co., Tulsa, has changed its name to Helmerich & Payne, Inc., the name of its principal operating division. The change was effective August 1.

Three giant tank trucks have been put into service hauling gasoline and jet fuel between British American Oil's Clarkson, Ont., refinery and North Bay, Ont. The trucks carry 9,250 gal. in seven 1,320-gal. compartments. B-A expects the three $40,000 units to reduce delivery costs in the 425-mile haul by 20% since they will eliminate need for handling at intermediate bulk terminals.

Louisiana has set its August production allowable at 913,815 bbl. daily, an increase over July of 12,171 bbl. daily for new wells.

All stock of Coronet Oil Co., Midland, a wholly-owned subsidiary of Placer Development, Ltd., of Vancouver, B. C., has been purchased for $12,190,436 by Hamer Corp., Midland. Hamer immediately dissolved the company and turned the purchased oil production to Hall Brothers, Abilene, Tex. Consideration in this deal was not disclosed.

Bought by Hamer and resold to Hall Brothers were 49 producing oil wells—most of them in Ector, Scurry, and Winkler counties in West Texas.

Part of J. P. Neill's spread at work on a line near Laurinburg, N. C. An official of the company reports: "The No. 572 is the best all-around pipelayer you can put on any spread. We know from experience it will handle hard jobs with ease."

TOUGH PIPELAYING PAIR

These are just two of a number of Caterpillar Pipelayers used by J. P. Neill on the North Carolina Natural Gas Corporation's line near Laurinburg, N. C. A D7 is lending a hand through swampy ground that, along with rolling hills of sandy clay, makes up the right of way. The spread's on schedule—just what you'd expect with these pipelayers.

Big features on this tough pair account for their productivity . . . plenty of dependable engine horsepower to push the machines through hard going like this with power left over to handle a long string of heavy pipe.

The No. 572 Pipelayer shoulders 86,000-pound lifts and maneuvers with finger-tip ease . . . thanks to hydraulic boosted steering. The torque converter drive lets the pipelayer inch along with full power.

The MD7 is close to the No. 572 in lift capacity and features. The same hydraulic boosted steering system plus the easily engaged and disengaged Cat exclusive oil clutch account for the ease of maneuvering the MD7. And that famous oil clutch typically gives an entire hard-work season without even an adjustment. Both machines take top awards in dependability and high production at low cost with less job time for maintenance.

SEE YOUR CATERPILLAR DEALER

Get the facts about these two rugged pipelayers and learn about the other Caterpillar machines that have earned *and maintain* the reputation for high production at low costs even in the worst conditions.

Ask your Caterpillar Dealer for a demonstration. Make it rough—see for yourself how easily Cat machines handle the hard work.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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TOUGH MACHINES FOR THE HARD WORK

Volume of Imports Falls Below Quotas

- Carson's figures show importers were 30,835 bbl. daily under allocations during the first quota period which ended on June 30.

OIL imports dropped more than 30,000 bbl. daily below allocations during the first quota period under the mandatory control program.

During the period ending June 30 imports controlled by the program totaled 1,441,509 bbl. daily throughout the United States and Canada, the Department of Interior announced last week.

The total compares with import allowables of 1,472,344 bbl. daily.

Figures for actual imports do not cover 93,776 bbl. daily of Canadian crude imported during June under an exemption from the program authorized by President Eisenhower. Also excluded are imports of bonded fuel oil for use outside the country.

Since quotas for the first period expired at the end of June, importers will not be allowed to "make up" the differences of 30,835 bbl. daily between imports and allocations.

Import controls, established by presidential proclamation, went into effect March 11 on crude and unfinished oils and April 1 on residual fuel oil and finished petroleum products.

New quotas, for the second half of the year, were set earlier at slightly more than 1,450,000 bbl. daily, or about 8,500 bbl. a day above actual controlled imports during the first allocation period.

Finished Products Imported in June

(Barrels per day)

Districts 1-4

Importers	Residual	Other Products
Ashland	452	....
Asiatic	1,990	13
Ballard	....	2,194
Belcher	1,312	....
Buckley Bros.	9,401	....
Canadian National Railways	8	....
Central	9,343	....
Colonial Oil	8,209	....
Copeland Terminals	37	....
Gulf	2,662	7,941
Hess	14,518	4,753
Lubrizol Corp.	....	4
Metropolitan	32,266	8,845
Military Petroleum	1,015	47,075
New England Petroleum	4,454	....
Paragon	60,502	598
Peirce Bros.	....	9
Pure	588	8
Royal	1,797	2,492
Shell	3,366	7,866
Sinclair	867	....
Socony Mobil	753	75
C. H. Sprague & Son	20,751	....
Standard (Calif.)	....	8,250
Standard (Ind.)	17,816	....
Standard (N. J.)	98,713	29,416
Standard (Ky.)	3,079	....
Shell Caribbean	14,771	....
Sun	....	1,832
Texaco	2,578	....
Whale Oil	913	....
White Fuel	8,705	....
Western Solvents	....	4
Totals	**320,866**	**121,375**

District 5

Importers	Residual	Other Products
Alaska Propane	....	19
Calor Gas	....	8
Fairbanks Plumbing	....	5
Standard (Calif.)	....	1,652
Time Oil	....	6,260
Total	....	**7,944**

Puerto Rico

Importers	Residual	Other Products
Shell (Puerto Rico)	....	338
Porto Rico Iron Works	1,505	....
Totals	**1,505**	**338**

Jump in June . . . Capt. Matthew V. Carson, Jr., head of Interior's oil import administration, reported that June imports rose to 1,838,901 bbl. daily in the United States and Canada.

This total includes overland imports from Canada, which are exempted from controls. In June, exempted imports from Canada included 52,533 bbl. daily of crude oil coming into U. S. Districts 1-4 and 41,243 bbl. daily coming into West Coast District 5.

Excluding exempted oil from Canada, imports into Districts 1-4 during June included 940,213 bbl. daily of crude and unfinished oil; 320,866 bbl. daily of residual fuel oil; and 121,375 bbl. daily of other finished products.

District 5 imports, excluding the Canadian oil, included 243,075 bbl. daily of crude and unfinished oil and 7,944 bbl. daily of finished products.

The 1,838,901 bbl. daily brought in during June represented a sharp increase over the approximately 1,400,000 bbl. daily reported for May. In both cases, totals include overland imports from Canada.

A breakdown . . . Here is Carson's breakdown of actual imports during the first allocation period, with quotas for each category given in parenthesis:

From March 11 through June 30, crude and unfinished imports included 750,869 bbl. daily in Districts 1-4 (757,121 bbl. daily licensed); 195,022 bbl. daily in District 5 (200,387 licensed); and 79,783 bbl. daily in Puerto Rico (80,883 licensed).

From April 1 through June 30, residual fuel included 331,389 bbl. daily in Districts 1-4 (343,347 licensed); 1,462 bbl. daily in Puerto Rico (3,011 licensed); and none into District 5 (3,866 licensed).

From April 1 through June 30, finished petroleum products included 76,146 bbl. daily in Districts 1-4 (76,198 licensed); 6,219 bbl. daily in District 5 (6,755 licensed); and 619 bbl. daily in Puerto Rico (776 licensed).

Comparison . . . Although importers failed to take advantage of their full quotas in the first allocation period, the increase in June sent crude-oil receipts far over the year- earlier level under the voluntary import program.

In June of this year crude imports into the U. S. mainland averaged about 1,217,000 bbl. daily. Under the discarded voluntary program, crude imports in June of last year were estimated at about 932,000 bbl. daily.

There is no direct comparison for product imports since they were not covered by the voluntary program in June 1958.

Controversy . . . Effectiveness of the program today remains almost as controversial a subject as the program itself was when first introduced.

Several changes in the program are under consideration by Interior officials. Perhaps the most imminent

Crude, Unfinished Oil Imports in June . . . barrels per day

Districts 1-4

Importers	Crude Oil	Unfinished Oil
American Petrofina	15,120	....
Anderson-Prichard	6,434	....
Ashland Oil & Ref.	10,469	2,123
Atlantic Refining	46,194	....
Aurora	8,698	709
Bay Refining	2,160	....
Bell Oil & Gas	3,644	....
Berry Asphalt	1,269	....
Berry Refining	2,128	....
Cactus Petroleum	896	....
Calumet Refining	821	....
Canal Refining	448	....
Century Refining	1,008	....
Champlin	1,919	....
Cities Service	4,105	....
Clark Oil & Refining	3,288	....
Continental	22,398	....
Cooperative Ref. Assn.	6,209	....
Cosden Petroleum	8,296	....
Cracker Asphalt	560	....
Henry H. Cross	1,232	....
Crown Central	6,485	....
Danaho Refining	1,493	....
Delhi-Taylor	2,970	....
Delhi-Taylor (Mayfair)	2,016	....
Eastern States	26,448	....
Eddy Refining	859	....
Elk Refining	1,829	37
El Paso Natural	5,637	....
Empire Petroleum	1,829	....
Empire State Oil	1,194	....
Famariss Oil & Ref.	635	....
Frontier Refining	3,751	....
Gabriel Oil	7,467	....
Great Western	821	....
Gulf	83,699	10,832
Hess, Inc.	7,290	....
Howell Refining	1,493	....
Hunt Oil	1,982	220
Husky Oil	2,501	....
Indiana Coop.	2,393	....
International Ref.	8,400	....
S. D. Jarvis	485	....
Kendall Refining	1,717	....
Kerr-McGee	4,896	....
LaGloria Oil & Gas	6,269	....
Laketon Asphalt Ref.	821	....
Leonard Refineries	2,432	....
Macmillan Petroleum	1,277	142
Malco Refining	2,684	....
Mid-America Ref.	933	....
Midland Cooperative	4,816	....
Monarch Refining	933	....
Monsanto Chemical	11,759	....
Murphy Corp.	3,432	....
National Coop. Ref.	2,181	....
Northwestern Ref.	9,200	....
Ohio Oil	5,470	....
Oriental Refining	1,594	....
Pennsylvania Ref.	470	52
Petroleum Refining	811	....
Phillips	27,786	....
Pontiac Refining	13,188	....
Premier Oil Refining	5,787	....
Pure	19,859	....
Quaker Oil Refining	3,472	....
R. J. Oil & Refining	1,531	....
Rado Refining	149	....
Republic Oil	22	....
Rock Island	125	....
Seminole Asphalt	21	....
Shamrock Oil & Gas	7,627	847
Shell	31,087	7,904
Sinclair	41,990	....
Sioux Oil	1,717	....
Skelly	18,704	....
Socony Mobil	50,036	2,198
Sonneborn Sons	597	....
South Penn	4,219	....
Southland	8,960	....
Southwestern Oil	5,028	....
Standard (Calif.)	31,029	9,553
Standard (Ind.)	33,049	2,053
Standard (Ohio)	9,813	....
Standard (N. J.)	33,166	....
Sun	40,208	....
Sunray-Mid-Cont.	12,440	....
Suntide	2,456	....
Sure-Seal	179	....
Tennessee Gas	4,896	....
Texaco	36,007	8,783
Texas Asphalt	5,793	....
Texas Calgary	709	....
Texas City Refining	11,893	....
Texas Gas	2,348	....
Three Rivers	336	....
Tidewater	35,407	....
Union	1,260	140
United Refining	909	....
Vickers	3,557	....
Vulcan Asphalt	706	78
Warrior Asphalt	448	....
Waskom Nat. Gas	287	....
Western States	1,867	....
Westland	635	....
Wickett Refining	1,008	....
Wolf's Head	706	....
Wyandotte Chemical	857	....
Totals	**894,542**	**45,671**

Canadian Imports Exempted

Importers	Crude Oil	Unfinished Oil
Bay Refining	3,791	....
Great Northern	27,027	....
International Ref.	6,959	....
Lakehead Pipe Line	247	....
Leonard Refineries	3,274	....
Murphy Corp.	5,228	....
Northwestern Ref.	6,007	....
Total	**52,533**	....

District 5

Importers	Crude Oil	Unfinished Oil
Bankline	5,182	....
Douglas	4,150	....
Edgington	2,091	....
Fletcher	15,530	....
Golden Bear	2,723	300
Golden Eagle	742	....
Macmillan	1,895	....
Mohawk	4,405	....
Palomar	966	....
Powerine	4,592	....
Richfield	7,269	255
Shell	24,000	8,355
Signal	11,945	....
Socal	1,955	....
Socony Mobil	17,117	....
Standard (Calif.)	10,021	....
Sunland	5,189	....
Texaco	4,074	5,474
Tidewater	41,983	....
Union	34,057	....
U. S. Oil & Refining	13,340	....
Wilshire	15,465	....
Total	**228,691**	**14,384**

Canadian Imports Exempted

Importers	Crude Oil	Unfinished Oil
Shell	10,074	....
Socony	27,408	....
Texaco	3,761	....
Total	**41,243**	....

Puerto Rico

Importers	Crude Oil	Unfinished Oil
Caribbean	17,611	2,827
Commonwealth	78,234	11,137
Total	**95,845**	**13,964**

change is relation of the qualifications for quotas to import finished petroleum products.

Imports officials admittedly have been "seriously considering" recommending to the President an amendment to permit newcomers to qualify for products allocations. "However," explained an Interior spokesman, "we have no assurance that an amendment will be made in the near future."

A high State Department official is expected to visit Caracas in the near future to discuss further changes in the import policy relating to Venezuela. There is little indication, however, that the U. S. is seriously considering adoption of a country-by-country quota system sought by Venezuela.

There is a possibility—perhaps a likelihood—that residual quotas will be increased. But since importers hadn't brought in their full quotas up to June 30, there's expected to be little pressure in that direction until cold weather hits. There also is talk of a possible concession to permit larger volumes of Venezuelan asphaltic crude to enter this country.

Gasoline Tax Boost Is Turned Down

- House committee instead urges a $1-billion bond issue and diversion of auto excise funds to keep road-building program from stalling.

THE ADMINISTRATION'S tax-boosting highway plan has been detoured by the House ways and means committee.

After giving a defiant "nay" to a gasoline-tax increase, the committee voted out a substitute plan calling for a slowdown in highway construction and a federal bond issue to help finance the near-bankrupt program.

The no-tax-increase plan calls for the issuance of up to $1 billion in bonds by June 30, 1961, to help meet federal obligations to the states for highway construction. The bonds would be retired within 5 years from the highway trust fund.

To help bolster the trust fund, the committee proposes to earmark 20% of the receipts from the automobile excise tax for highway purposes. Diversion of the excise collections from the general fund would begin July 1, 1961, and continue for 4 years. This would add about $250 million a year, or a total of about $1 billion, to the highway fund.

Coupled with the proposed bond issue is a 4-year extension of the highway program past its 1972 scheduled completion date.

Some cutbacks . . . If the bond-issue route is approved, it would involve a sharp cutback in federal highway allocations for the year starting next July 1.

The allocations, scheduled to be made by about September 1, would be reduced from the proposed $2.5 billion to about $600 million.

For the following year, allocations would rise to about $1.4 billion.

Several alternate proposals were considered by the tax-writing ways and means committee in closed-door sessions last week.

Temporary increases in the gasoline tax, ranging from 0.5 to 1 cent per gallon, were rejected by lopsided votes. According to reports from within the committee, none of the tax-increase plans received more than 6 favorable votes out of a total of 25.

President Eisenhower's proposal for an increase from the present 3 cents to 4.5 cents per gallon apparently was never seriously considered in the 2-day meeting.

One no-tax plan discussed by the committee called for borrowing against the trust fund to meet existing obligations, coupled with a moratorium on future contracts. This was voted down, 12 to 11.

Trouble in Senate . . . The bond-issue plan, originally submitted by Rep. Frank Ikard, was approved 15 to 10.

Ikard is a close associate of Speaker Sam Rayburn, a fellow Texas Democrat, and presumably represents the leadership's views on the high-financing problem.

If the proposal clears the House, it may run into trouble in the Senate. Chairman Harry F. Byrd (D-Va.) of the Senate finance committee has indicated he prefers a gasoline-tax hike to the issuance of revenue bonds.

Strong opposition, also can be expected from the White House. President Eisenhower has hinted several times that he would veto a plan calling for deficit financing or diversion of revenue from the general fund to continue the highway program. Others in the administration have spoken out in opposition to bonds.

Since the House plan calls for diversion and bond-financing on a relatively minor scale, its proponents apparently feel it has a fair chance to escape a veto, especially if a complete cutoff in interstate highway allocations is the only alternative. Highway officials have warned that none of the $2.5 billion apportionment for the interstate system can be made for next fiscal year under present conditions.

Pitch for asphalt . . . About 4,000 miles of the proposed 41,000-mile interstate system has been completed since the original stepped-up highway program was approved by Congress in 1956.

Work has started on projects totaling about 4,000 miles more.

Cost of the interstate program is estimated at about $40 billion, of which the federal Government is to pay 90% and the state 10%. Unless new sources of revenue are provided, a deficit of about $500 million is anticipated this fiscal year in the highway trust fund, from which federal allocations are made.

Reid Brazell, of Leonard Refineries, Inc., presented figures to the ways and means committee showing that nearly $3 billion could be saved by paving the interstate system with asphalt, which is now barred by some state officials.

Journal to Open London Office

THE OIL AND GAS JOURNAL will expand its foreign activities this fall with the opening of an office in London.

Heading the office will be Kenneth B. Barnes, as vice president for Eastern Hemisphere operations. The office will be responsible for business and editorial activities.

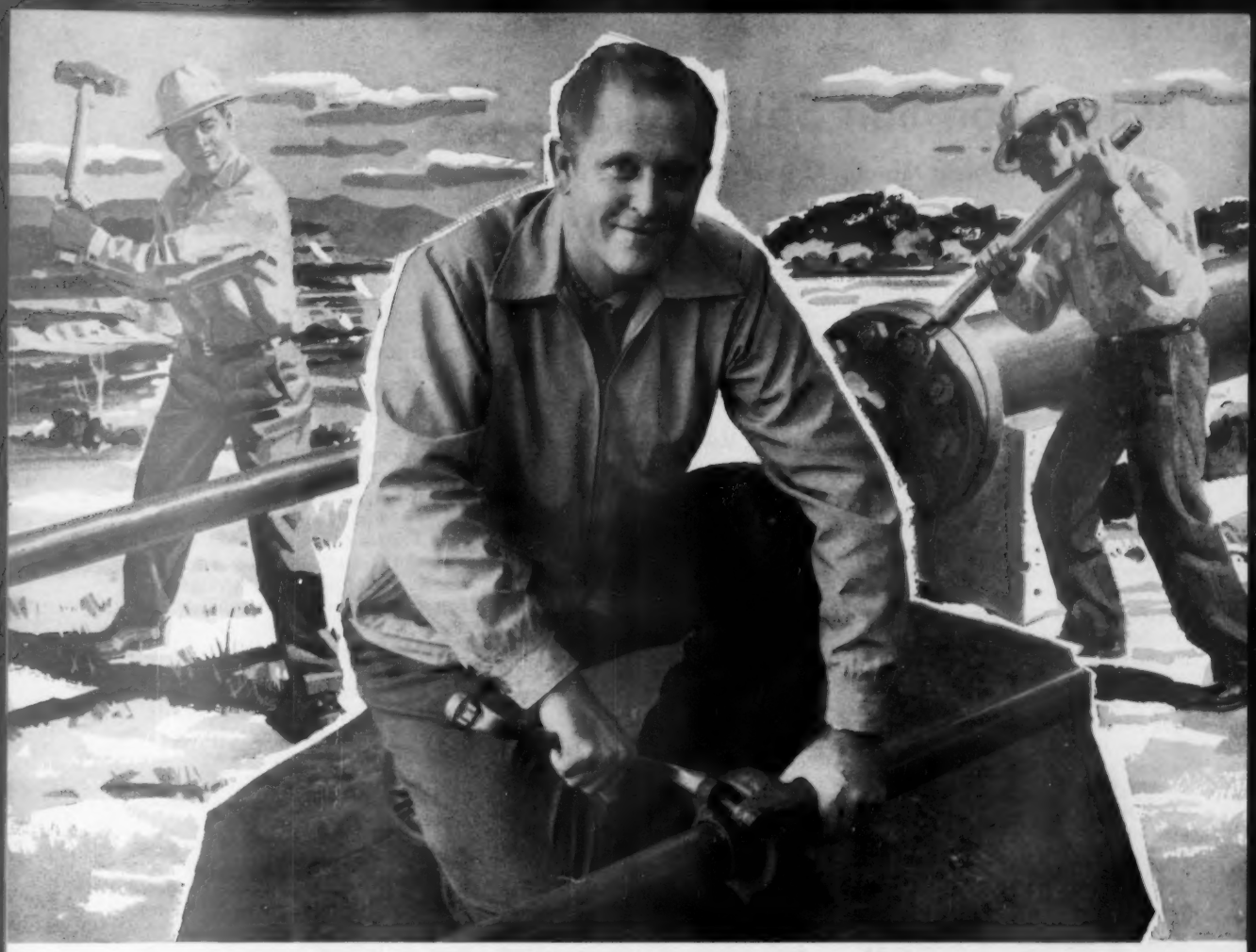
Barnes, who served as editor of the Journal for 6 years, for the past year has been vice president and editorial director. He will move to London about September 1.

Barnes joined the Journal in 1944 as engineering editor. He later was promoted to managing editor, and in 1952 became editor of the magazine.

Before coming to the Journal he was assistant chief engineer in the Tulsa division of Gulf Oil Corp. Prior to his Gulf affiliation he had been with Cities Service Oil Co. and Continental Oil Co.

He is a graduate of the University of Oklahoma and has a M.S. degree in petroleum engineering from Pennsylvania State University. He has served on the faculty of both Pennsylvania State and Tulsa University.

Kenneth B. Barnes



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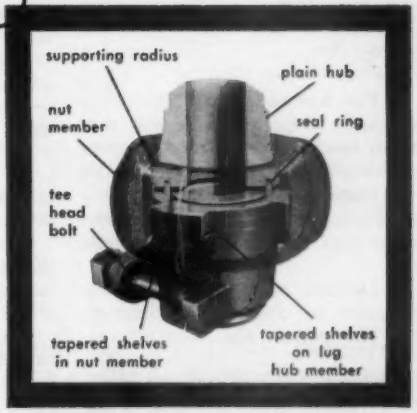

The above drawing shows a UNIBOLT Coupling partially cut away and the nut member in a transparent blue color to reveal the mechanical features of the coupling.

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Richardson Suit Set for Trial

. . . in Amarillo next March. At issue: Did Skelly, Pan Am violate patents in leaching out salt caverns to store LPG?

EYES of the entire LPG, and consequently most of the oil industry, will be fixed on Amarillo, Tex., next March.

A federal district judge there has fixed that time tentatively for trial of suits filed by Sid Richardson, Fort Worth independent, against Pan American Petroleum Corp. and Skelly Oil Co. for alleged infringements covering storage of LPG in leached-out salt caverns.

The trial was set following a hearing on motions by both sides.

They also agreed to permit Gulf Oil Corp. to intervene on behalf of Pan Am since a Gulf subsidiary, Warren Petroleum Corp., is part owner of the Pan Am operation.

The outlook is for a bitter, hard-fought trial lasting at least 3 weeks.

If Richardson should win, he might be able to make similar suits stick against virtually every operator now storing LPG in salt caverns, or require royalty payments under threat of a suit. Involved would be millions of dollars.

The Fort Worth operator in the Amarillo case is seeking injunctions against withdrawal of LPG storage from Pan Am and Skelly operations in Hockley and Carson counties. He also asks a maximum recovery of triple actual damages.

Richardson accuses the defendants of infringing on his Reissue Patent 24318 which covers storage of LPG, natural gas, or any other product in a salt cavern "formed by dissolving the salt with water and removing the so-formed brine."

The suit alleges that:

. . . Pan Am and Skelly since 1951 have been storing LPG in salt caverns in Hockley and Carson counties in direct violation of the patents.

. . . Both companies were represented at a demonstration of the methods covered in the patents in August 1950.

. . . Licenses were offered to the companies to operate such storage under the patents and were refused.

The defense . . . Pan Am and Skelly attack validity of the issuance of the patent, claiming that the methods of salt storage described are not patentable.

Pan Am contended in its answer to the charges that subject matter of the patent is covered in full or in part in 10 previous U. S. licenses and in one French, one Swedish, and two German patents. These date back to 1883. A German patent of 1919 and an American patent issued in 1934 were referred to in Richardson's file when his patent was issued.

What's at stake . . . The Journal in its last survey of underground storage of LPG found capacity totaling 42½ million barrels in the U. S., with about 36 million barrels in cavities in salt domes and formations (Sept. 29, 1958, p. 40).

More than 550,000 gal. is being withdrawn from storage yearly and the volume is increasing.

Pan Am and Skelly attorneys say contracts submitted to them in Tulsa by Richardson representatives on the day the suits were filed called for a license fee of ⅛ cent per gallon of LPG withdrawn from storage.

Based on such a royalty charge, annual payment in license fees by the more than 50 companies using LPG storage in salt cavities would run around $700,000 annually.

And, should retroactive fees be figured to 1951, these would total millions of dollars.

Small wonder, then, that the LPG industry is watching the Amarillo case with acute concern.

Union Buys Moss Interests

INFORMED SOURCES last week reported another large sale of Permian basin oil production.

Union Oil Co. of California acquired roughly 1,500 bbl. daily of new oil production in a purchase of leases and varying amounts of working and royalty interest under 37,400 acres in 14 Texas and New Mexico counties from Paul Moss, independent operator of Odessa, Tex.

Payment was reportedly in cash, the amount not known. Union hikes its reserves via the deal by about 12,000,000 bbl.

The 1,500 bbl. daily of oil production changing hands—about half from working interests and half from royalty—comes from 428 producing wells on 22,000 acres. The remaining 7,000 acres is undeveloped acreage.

The deal with Moss also included an agreement to sign over to Union a one-half interest in the deep mineral rights on 8,400 acres in the South Cowden and Harper shallow pool areas in Ector County. Prospects are considered bright in some geological quarters for developing deep Devonian and Ellenburger pay in these areas.

New Gas Plan Lags

. . . as FPC is urged to rush Canadian pipeline permit.

A REVISED proposal for importing Canadian gas to serve U. S. markets in the upper Midwest apparently faces a long delay before the Federal Power Commission.

At opening hearings before FPC Examiner Emery J. Woodall last week, attorneys for Midwestern Gas Transmission Co. and Michigan Wisconsin Pipe Line Co. urged quick action on their related projects to handle Canadian gas.

Harry S. Littman, Midwestern attorney, said it was "urgent" that the case be expedited so an FPC certificate could be issued by November 1. He and Charles Shannon, counsel for Michigan Wisconsin, suggested the present hearing might run a few days into August to permit completion of direct testimony.

"You don't expect a certificate by November 1," Woodall said. He pointed out that the FPC has a policy against holding hearings in August except in emergency. Unless ordered to do so, he said, he would not continue the hearings during August.

Midwestern is seeking authority to construct a 504-mile pipeline to bring Canadian gas from the border near Emerson, Manitoba, to the Marshfield, Wis., area.

PROCESSING

A new sulfur recovery plant, with capacity of 100 short tons per day, has been completed at the Mobil Oil refinery in Paulsboro, N. J. Sulfur obtained from processing sour refinery gases is shipped in molten state for industrial uses. Badger Manufacturing Co., Cambridge, Mass., handled engineering and construction.

A new benzene unit has been placed on stream by Gulf Oil Corp. at its Port Arthur, Tex., refinery. Capacity is 30 million gallons annually of benzene. The unit has seven heaters and three towers in the Hydrobon and Platforming sections and eight towers, an extractor, and two clay-treating towers on the Udex and Aromatic fractionation sections. Procon,

The $52,000,000 project, including about 56 miles of lateral lines, would move up to 204,000,000 cu. ft. of gas daily. The proposal is a substitute for an earlier import plan turned down by the FPC last year.

Michigan Wisconsin, which would take 158,000,000 cu. ft. per day of the Canadian gas, plans a $24,000,000 program to enlarge and expand its transmission system in the upper Midwest.

New Alaskan Well

. . . makes score 3 producers and one dry on Kenai tract.

COMPLETION of the third producer and moving in of a third rig marked the stepped-up pace of development in the Swanson River unit on Alaska's Kenai peninsula.

The latest well, 14-15 Swanson River, was completed by Standard Oil Co. of California flowing 3,100 bbl. daily of 30°-gravity crude from an undisclosed interval. It is located 1½ miles southwest of the field discovery well completed two years ago when Richfield Oil Corp. operated the unit.

The new completion has an interesting history. It was originally drilled to 12,582 ft. as 4 Swanson River. It was then plugged back, renamed 4A Swanson River, and redrilled to 11,460 ft. While being redrilled, its name was changed a third time to the present one, 14-15 Swanson River.

Rigs active . . . The tally on the 71,680-acre unit now reads three completions and one dry hole, both extensions successfully completed thus far have been south and southwest of the discovery.

The only try north of the discovery 3 Swanson River, resulted in the dry hole.

The second Coastal Drilling Co. rig currently being moved to the unit is slated to drill 32-15 Swanson River about midway between the new completion and the discovery well.

In the other active drilling project on the unit operated by Standard of California, a Mountain States Drilling Co. rig was drilling below 7,234 ft. on 12-27 Swanson River. This test is located almost 3 miles southwest of the discovery and is about ¾ of a mile south of 2 Swanson River.

Standard of California will move the other Coastal Drilling Co. rig on the unit to drill 5 Swanson River, ⅝ of a mile northwest of the discovery.

Gas Find Tests Eight Sands

PAN AMERICAN Petroleum Corp. has brought in an offshore Louisiana gas discovery with eight possible pay zones.

The wildcat is located 1 mile east of the nearest production in the Block 176 field, Ship Shoal area, 45 miles from shore. It was drilled in 97 ft. of water on a 5,000-acre lease which cost Pan American $1,250,000. Pan Am and Texaco, Inc., each own a 50% interest in the well.

A drillstem check on a 16/64-in. choke recorded a flow of 3 million cubic feet of gas daily from perforations at 6,814-26 ft.

The operators reported they have eight possible pay sands tested successfully between 4,170 ft. and 6,900 ft. The sands total 142 ft.

No Hearing Needed

. . . in Louisiana for LACT units if partners agree.

LOUISIANA has granted authority to oil producers to install and operate lease automatic custody transfer systems without facing the delay of lengthy public hearings.

Recognizing that LACT is a "good conservation practice," Conservation Commissioner Ashton J. Mouton signed an order eliminating public hearings when all interested parties are in agreement.

The order also permits operators to produce up to 25% over their daily allowable in any given day, provided the monthly total does not exceed the monthly allowable.

Administrative approval of applications can be granted when the operator presents a schematic diagram of the installation with an explanation of the flow and locking devices to prevent tampering.

Both the producer and carrier must co-sign a statement that the system will give a reasonably accurate measurement and not create inequities.

A list of all interested parties, including operators and royalty owners, must be provided. Notice of the application will be published and copies sent to the interested parties. If anyone protests, a public hearing is required.

A number of companies have installed automatic custody transfer systems in Louisiana, Texas, and other states, but Louisiana is the first to permit their installation without hearing.

BRIEFS . . .

a subsidiary of Universal Oil Products Co., was prime contractor.

A new unifining system has been installed at the United Refining plant at Warren, Pa., adjacent to an old unit which was the first unifiner ever built. The new system includes a stripping tower, horizontal flash drum and heat-exchanger train, vertical heater and reactor. It was designed by Blaw-Knox Co., Pittsburgh.

Major expansion of facilities to double polybutene production at Cosden Petroleum's Big Spring, Tex., refinery has been completed. At the same time, Cosden has licensed its polybutene manufacturing process to Texas Butadiene & Chemical for use at TB&C's Channelview plant near Houston.

National headquarters of the Western Petroleum Refiners Association have been moved to the Beacon building in Tulsa from the Hunt building. Increased activity of the WRPA, now in its 47th year, prompted the move, Paul D. Williams, executive secretary, said.

A new solvent plant with capacity of 2,500 bbl. daily has been completed by Delhi-Taylor Oil at Corpus Christi. The unit will produce heavy aromatic, aliphatic, and other specialty solvents.

Also for Refiners . . .

IN THE NEWS: Refinery strikes spread to Indiana Standard's big Whiting plant (p. 43) . . . Volume of imports in first mandatory-control period falls 30,835 bbl. daily below allocations (p. 52) . . . House committee turns down gasoline-tax boost for a $1-billion bond issue to finance interstate highways (p. 54) . . . Peru and Ecuador increases its prices for petroleum products (p. 62).

PLUS THESE TECHNICAL REPORTS: Computer control of internal reflux fractionators (p. 68) . . . The alkazid process for removing H_2S and CO_2 from gas (p. 100).

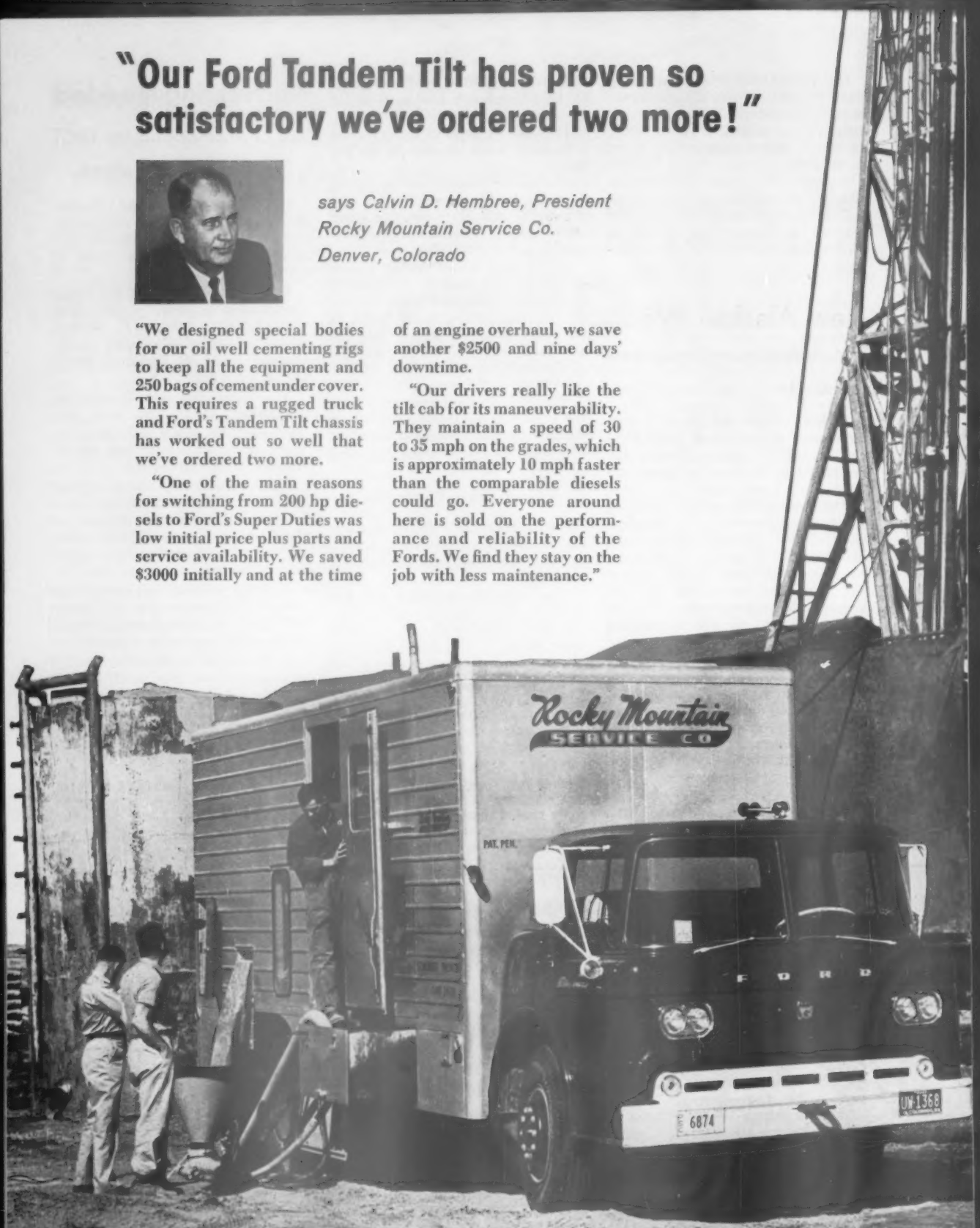
"Our Ford Tandem Tilt has proven so satisfactory we've ordered two more!"

says Calvin D. Hembree, President
Rocky Mountain Service Co.
Denver, Colorado

"We designed special bodies for our oil well cementing rigs to keep all the equipment and 250 bags of cement under cover. This requires a rugged truck and Ford's Tandem Tilt chassis has worked out so well that we've ordered two more.

"One of the main reasons for switching from 200 hp diesels to Ford's Super Duties was low initial price plus parts and service availability. We saved $3000 initially and at the time of an engine overhaul, we save another $2500 and nine days' downtime.

"Our drivers really like the tilt cab for its maneuverability. They maintain a speed of 30 to 35 mph on the grades, which is approximately 10 mph faster than the comparable diesels could go. Everyone around here is sold on the performance and reliability of the Fords. We find they stay on the job with less maintenance."



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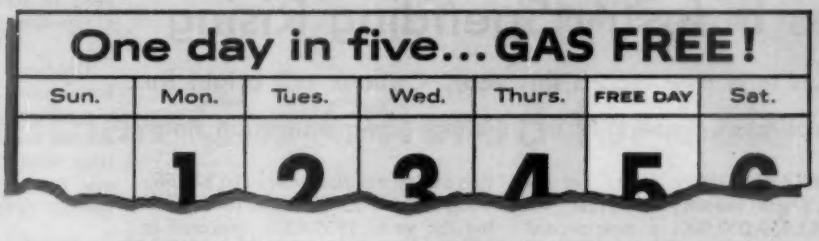
— LESS TO OWN . . . LESS TO RUN . . . LAST LONGER, TOO!



'59 FORD PICKUPS GIVE 25.2% MORE MPG!

25.2% advantage delivered in Economy Showdown Tests means five days' driving on four days' gas

A leading automotive research group proved that a '59 Ford Six Pickup will run five days on the same amount of gas the average competitive '59 pickup burns in four days.

The tests were made on 1959 six-cylinder ½-ton pickups of the six leading makes purchased from dealers – just as you would. The trucks were tested in every kind of driving – high and low speeds, open highway and city streets, even simulated door-to-door delivery. And in every test '59 Ford Sixes delivered better mileage than any other make.

Here are the actual percentages:

'59 FORD PICKUP SIXES GAVE

42.6% better mileage than make "D"
31.1% better mileage than make "I"
25.2% better mileage than make "C"
22.0% better mileage than make "S"
9.6% better mileage than make "G"

What's the secret of Ford's economy? First, of all pickup sixes, only the Ford Six has modern Short Stroke design which reduces engine friction and thus requires less fuel.

Second, to this modern six-cylinder engine, Ford has added a new economy carburetor to meter fuel more precisely in both high- and low-speed ranges.

Your Ford Dealer has the complete report of Economy Showdown U.S.A. See him and get the whole story firsthand.

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Go Ford-ward for savings!

Gas Industry Spending Rising

. . . to a new record this year. Outlook still bright for expansion, especially in building gas-transmission lines.

CONSTRUCTION outlay for the nation's gas industry this year will total $1,859,000,000, a new record.

The American Gas Association estimates the expenditures will be 4.9% higher than the industry's previous peak of $1,772,000,000 in 1957. They will be 14.9% greater than 1958 spending.

The outlook, according to company estimates given AGA, also is for continued gains in spending. Construction outlay will rise steadily to $2,166,000,000 in 1962. The total outlay during the years 1959-62 is expected to reach $7.9 billion, a 25.7% gain over the previous 4-year period.

The gas industry's extension of transmission systems still accounts for the largest share of the expenditures. These outlays totaled $715,000,000 last year, are expected to increase to $809,000,000 this year and reach $1,025,000,000 by 1962.

Natural-Gas Construction Spending

(million dollars)

Facility	Actual	Forecast			
	1958	1959	1960	1961	1962
Production, storage	$ 214	$ 205	$ 208	$ 166	$ 177
Transmission	713	807	773	911	1,022
Underground storage	73	115	118	112	123
Distribution	497	605	670	650	678
General	69	74	74	76	94
Total	$1,566	$1,806	$1,843	$1,915	$2,094

Quadruple Wells Approved

. . . by Texas Railroad Commission. Humble plans all three of the projects—two in North Alazan, other in Stratton.

THE TEXAS Railroad Commission flashed the green light last week for three more quadruple well completions in Texas—all for Humble Oil & Refining Co.

Two will be completed from four oil zones in North Alazan field of Kleberg County. The other will produce four gas pays in Stratton field, also in Kleberg County.

All three will use three tubing strings and the casing-tubing annulus for fluid flow.

Humble's A-16 King Ranch Stratton will produce gas from the J-10 sand through the lower string of tubing, from the West Middle Austin sand through the middle tubing, from the 6,000-ft. sand through the upper tubing, and from the upper Rivers "A" sand through the annulus.

The company's 11 King Ranch Alazan well will produce oil from the H-86 sand through the lower tubing, from the H-21 sand through the middle tubing, from the H-02 sand through the upper tubing, and from the F-77 sand through the annulus.

Its 12 King Ranch Alazan will produce oil similarly from the I-29, H-86, H-46, and H-21 sands, respectively.

The Humble quadruples will be the second, third, and fourth for Texas. The only one approved by the commission previously was that of Magnolia Petroleum Co. in May 1958.

This one, the Magnolia 8 Santa Cruz Farms in San Carlos field of Hidalgo County, produces from four Frio gas reservoirs.

Flaring Ban Deadline Set

OPERATORS in two northwestern New Mexico oil pools have until Jan. 1, 1960, to make arrangements for recovery and marketing of natural gas.

An order by the New Mexico Oil Conservation Commission applies to the big Bisti-Gallup pool south of Farmington and to the nearby Gallegos-Gallup pool. Flaring of surface gas now is allowed.

E. S. Fischer, staff engineer of the OCC, estimated that operators would need to spend about $2,000,000 for a pipeline gathering system for the gas.

Operators in the field asked the commission to delay its decision on disposal of the gas for at least 6 months. They contended that much time would be needed to obtain Federal Power Commission approval for gas-sale contracts.

U. S. Wants Helium

. . . stocks increased and 12 extraction plants built.

THE INTERIOR Department is again seeking legislation authorizing a joint government-industry program for conservation of helium.

Acting Sec. Elmer F. Bennett last week sent to congressional leaders a bill giving the department authority to recover and store for future use some 32 billion cubic feet of helium from natural gas. The bill is similar to one submitted last year shortly before Congress adjourned.

The interior plan provides for private financing, building, and operation of up to 12 helium-extraction plants to be located along pipelines carrying helium-bearing natural gas. If private industry fails to cooperate in the program, interior would be authorized to proceed by use of government funds.

No new discoveries . . . Approximately 90% of the nation's present helium production is used for government defense and atomic-energy programs, Bennett pointed out. Domestic consumption of helium has risen from less than 5,000,000 cu. ft. in 1937 to about 370,000,000 cu. ft. annually.

The nation's entire supply of helium is now produced in government-owned plants by Interior's Bureau of Mines. Bureau officials have pointed out that there have been no important new sources of helium discovered in this country since 1943.

Threat to nation . . . This poses a danger down the line.

If the loss of helium in fuel gases continues, they predict present sources will be inadequate to meet essential helium demand past 1980 or 1985.

Proposed legislation would authorize the secretary of interior to acquire helium or helium-bearing natural gas by eminent domain if he is unable to contract for it on terms satisfactory to the government.

Helium produced at the proposed plants would be stored underground in the government-owned Cliffside gas field near Amarillo until needed.

Saudi Arabian Gas Offered for Sale

• Industry throughout the world is being invited to Saudi Arabia to take advantage of Aramco's low-priced gas, either as fuel or raw material. Big brochure outlining availability and content of gas is off the press.

ARABIAN AMERICAN Oil Co. hung out a "gas for sale" shingle last week.

The big company which produces more than a million barrels of oil daily in Saudi Arabia says it has 163,000,000 cu. ft. per day available right now for a good customer. Next year it will have 201,000,000 cu. ft. daily and by 1961 the volume will rise to 214,000,000 cu. ft. daily.

This is in addition to the more than 400,000,000 cu. ft. daily which Aramco is reinjecting into oil producing reservoirs at Abqaiq and at Ain Dar in the northern part of the big Ghawar field.

Aramco didn't rule out selling the gas to anybody who will find a means of hauling it away, but the sales pitch is aimed definitely at potential industrial customers for Saudi Arabia.

The "gas-for-sale" offer made by Aramco was in the form of a glossy brochure published in color which the company plans to distribute throughout the world.

It represents a change in attitude for the company to some extent. It wasn't too many years ago that Aramco was inclined to discount the idea that vast volumes of gas were available in the Middle East. The company used to say it might be necessary to reinject most of the Saudi Arabian gas in order to produce its oil in the most efficient way.

Contracts variable . . . The company's large-scale gas-injection projects and gas used for fuel and the production of electric power in the country now account for 66% of the gas produced with its oil.

The remaining 34% flared has become a bone of contention with the conservation minded Saudi government.

Aramco's brochure says it hopes "low price and favorable contract terms" will tempt new industries to Saudi Arabia to use the gas for fuel, chemical processing, and any other purpose. Sales contracts will be negotiated and, Aramco says, "will vary with the quantity of gas, location, quality, and other factors."

The company plans to make delivery at or near the gas-oil separator facilities in its producing oil fields. The gas purchasers would be required to own and operate the necessary "gas and/or liquid" transportation lines. The company offers to help fix plant locations and obtain rights-of-way, a water supply, and adequate labor.

Contracts would be made for 20 years, but the company says a longer or shorter term can be negotiated with initial prices subject to "periodic adjustment."

Where it is . . . The big Ghawar producing trend accounts for the lion's share of the gas available today and for the estimates of future supplies.

As new fields are developed and present production expanded, more gas may be available than the present estimates.

A possibility for another supply is a high pressure, nonassociated gas reserve which the company says exists at Dammam, the first oil field found in Saudi Arabia. The extent of this reserve has never been determined.

Here's a Look at Saudi Arabian Gas Supplies

	Safaniya		Khursaniyah				Abqaiq			Ghawar: Ain Dar		Ghawar: Shedgum		Ghawar: Uthmaniyah			
Separator pressure (psig.)	45	1.0	175	50	5.0	1.3	250	50	1.3	50	1.3	50	1.3	175	50	5.0	1.3
Temperature (°F.)	100	100	145	140	...	135	155	145	135	115	110	103	..	120	115	..	110
Components (vol. %):																	
Carbon dioxide	1.9	1.3	7.0	5.5	7.0	1.8	7.7	5.7	1.9	9.8	3.5	10.6	3.5	7.5	7.5	7.5	2.9
Hydrogen sulfide	..	..	3.5	5.5	3.5	5.0	2.4	3.9	3.8	5.2	6.1	2.8	6.1	1.3	3.0	1.3	3.4
Methane	56.0	27.8	56.3	30.1	56.3	6.4	55.5	26.5	6.2	27.8	5.5	32.6	5.5	59.3	31.4	59.3	6.6
Ethane	19.0	20.0	17.9	25.6	17.9	18.6	20.4	29.3	23.1	26.1	21.6	23.8	21.6	17.0	26.6	17.0	21.1
Propane	14.3	27.1	9.7	20.1	9.7	31.2	8.1	17.9	27.2	18.4	32.7	19.4	32.7	9.4	20.3	9.4	33.3
Butanes	5.9	15.1	3.5	8.2	3.5	20.5	3.7	10.4	22.2	8.2	19.7	7.7	19.7	4.0	7.6	4.0	21.9
Pentanes	1.8	6.1	1.2	2.9	1.2	9.3	1.4	4.1	10.1	2.8	7.0	2.4	7.0	1.1	2.3	1.1	7.8
Hexanes	1.1	2.6	0.9	2.1	0.9	7.2	0.5	1.4	3.6	1.2	3.1	0.7	3.9	0.4	1.3	0.4	3.0
Heptane, plus	..	..	..	..	..	..	0.3	0.8	1.9	0.5	0.8	..	..	..	..	..	..
Quantity (million s.c.f.d.):																	
1959	5.3	2.3	..	..	..	..	10.1	11.9	6.2	20.1	6.8	4.0	7.0	32.7	9.0	37.2	10.5
1960	6.7	2.8	7.6	1.7	5.9	2.0	10.1	11.9	6.2	20.1	6.8	4.0	7.0	39.3	11.1	44.7	12.6
1961	8.1	3.3	7.6	1.7	5.9	2.0	16.8	19.8	10.3	20.1	6.8	4.0	7.0	36.6	10.2	41.4	11.7

Product Prices Hiked

. . . in Peru and Ecuador as governments seek a return of oil investments. Peru jumps gasoline from 9 to 24 cents.

PERU AND ECUADOR are ending a long drought for oil companies by raising product prices for the first time in years.

The governments of the two countries until now had refused to budge on the issue of prices, controlled by laws, despite complaints by companies. But in the last year, new investments in local operations virtually have ended, and the industries are now at a standstill.

Retail price of gasoline in Peru was raised from 9 cents to 24 cents per gallon. Price of other products was doubled, except for kerosine sold for household use. This was raised 23%.

Oil men are keeping their fingers crossed, hoping there will be no severe political repercussions from the steep increases. Reports are that local taxi drivers are threatening to strike. In order to head off protests on the increase of oil, as well as some other prices, wages also were raised for workers making less than $60 per month.

The increase is expected to enable companies, especially International Petroleum Co., to resume their investment programs. International, as operator for itself and on properties held jointly with Cia. Petrolera Lobitos, produces nearly 90% of the crude. It stopped drilling 8 months ago in the middle of a $40-million expansion program.

Production down . . . Peruvian production has slipped from 52,800 bbl. daily 2 years ago to less than 48,000 bbl. daily at present.

Only three rigs are being operated at present. A rotary outfit is drilling wells in a stratigraphic program being carried on offshore by Peruvian Pacific, a Cities Service-Richfield subsidiary. The other two rigs are cable-tool outfits being used by the government agency, Empresa Petrolifera Fiscal.

Brightest spot in the picture is the Peruvian Pacific program. Of four wells drilled 2 to 3 miles offshore, one has tested 200 bbl. daily, one 300 bbl. daily, and one 400 bbl. daily. The other well also had shows but was not tested. A fifth well is under way.

The tests have been drilled to depths of 900 ft. to 3,000 ft. to feel out the structure to see whether a permanent platform program is feasible. The present wells are not intended to be producers and they are being abandoned.

Ecuador relents . . . The Ecuadorian Government decreed price increases to take effect when Anglo-Ecuadorian Oilfields places a new refinery on stream at La Libertad.

The company suspended work more than a year ago on a 7,700-bbl. plant in a showdown over low prices. It was being built to replace an existing 5,000-bbl. plant under an agreement that gives the firm exclusive marketing rights.

But when the plant opens, it will use crude which is now exported by the company. The profit on the exports have been offsetting the losses taken on marketing operations.

Anglo-Ecuadorian said it plans to go ahead with the refinery program, even though the new prices will not be as high as originally hoped. The crude unit will be in operation in 6 months, and the rest of the complete refinery in 9 months. The plant will have a 6,000-bbl. thermal-cracking unit.

Drill Bits Hum in Argentina

DESPITE the political storm clouds hovering over Argentina, companies operating there on contracts are getting off to a good start.

In the year since President Arturo Frondizi announced precedent-shattering development contracts with foreign companies, work has gone ahead on schedule in programs that will mean investments of $224 million over the next 6 years.

Word from Buenos Aires is that the local oil picture is bright, and that the companies are being accepted in their day-by-day operations.

The only hitch is that YPF has yet to straighten out its own finances so that it can go ahead with straight contract drilling deals. Companies owned by individual state governments in Argentina owe YPF $60 million for oil supplies.

Deals have been made for 1,800 wells to be drilled by contractors who will be paid $50 million out of pocket by YPF. Southeastern Drilling Co. will drill 1,000 wells for $25 million. Kerr-McGee will drill 500 wells for $18 million, and C. J. Simpson Co., 300 wells for $10 million. The wells will be located along the southern flanks of fields in Comodoro Rivadavia.

But two of the most important agreements already are well under way. Pan American International (Indiana Standard) has completed 52 wells in 6 months in a 1,715-sq.-mile development area in Comodoro Rivadavia. L. R. Development, Ltd., (Loeb Rhoades Group) has drilled 21 wells in Mendoza. The companies will be paid on formulas based on crude output.

Superior Gets First Maracaibo Duster

SUPERIOR Oil Co. has drilled its first dry hole on its prolific acreage in Lake Maracaibo.

The duster was Lama 24, located just to the north of the northeastern corner of Sun Oil Co.'s Block 1. It is one location to the east of Lama 6.

The test closes a chapter in one of the most spectacular developments in the history of the industry. The company startled the oil world 3 years ago by paying $22 million for the 7,774-acre block. Then it drilled well after well with prolific production, sometimes in the 10,000-bbl.-daily class.

Superior had surprising luck up through Lama 22. This was the northeasternmost corner of the tract. Creole Petroleum had drilled a dry hole 1½ miles east-southeast, and Cia. Shell de Venezuela had a dry hole a slightly shorter distance to the north.

But Superior completed its test as a 1,150-bbl.-daily producer of 32°-gravity crude on a ½-in. choke.

Sun plans wildcat . . . Venezuelan Sun is expected to spud a wildcat soon in the southern part of Block 12 west of its prolific Block 1.

Two wells drilled earlier were suspended with only meager prospects for production.

Reports from Venezuela are that Pan Venezuelan (Indiana Standard) has favored the test because the block is its remaining hope for big-scale production in Venezuela. It has a third interest in Block 12, but none in Block 1. Sun is operator for both blocks.

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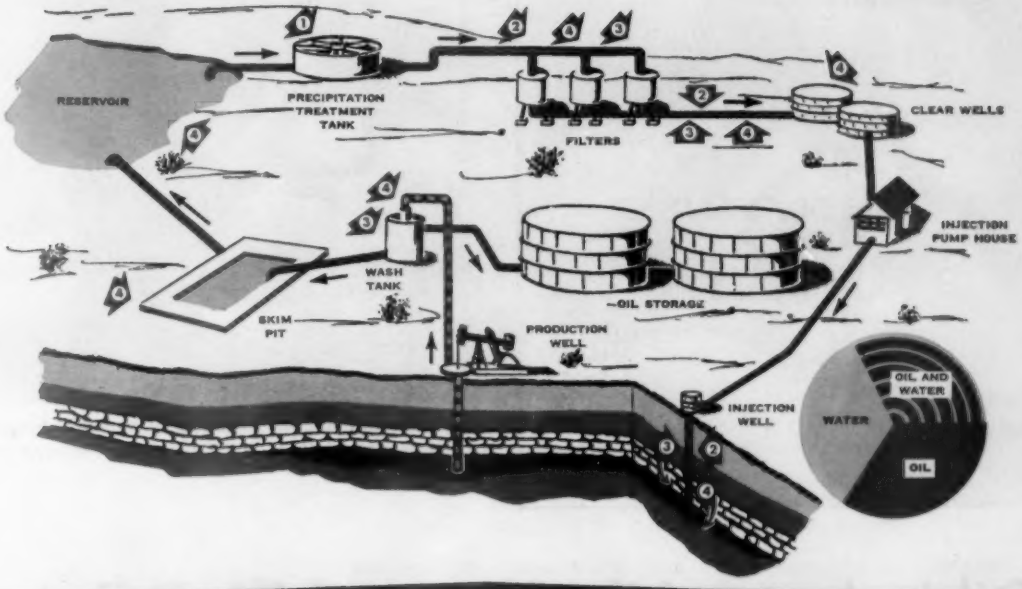

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QATARIS fish off pier near signal station (background), nerve center of Umm Said tanker terminal.

Oil Industry Life Blood of Tiny Qatar in

- Dukhan field now has 174,000-bbl.-daily production, and QPC is looking for more. A $4-million deep test is searching for a new productive zone.

Paul E. Swain
International Editor

IF IT weren't for oil, Qatar might well be called the land Allah forgot.

Qatar is a 100-mile long peninsula that juts northward into the Persian Gulf (the Arabs prefer "Arabian Gulf") from the mainland of Saudi Arabia. Only 50 miles wide, Qatar is a waterless, foodless desolation that a blazing sun seems determined to make just as inhospitable as possible.

It's a flat expanse of rocky desert, almost entirely devoid of even scrub vegetation. Except for its southern regions, Qatar can't even boast of the primitive beauty of sand dunes that are found in other Arabic lands. Its terrain can best be described as heated monotony.

But Qatar has oil. It is looking for more.

The sheikhdom's oil industry now pretty largely supports the land's 35,000 population. Before the discovery of oil and the rise of the Japanese seed pearl industry the Qataris, like their neighbors on Bahrain, were primarily pearlers. Almost all the population is centered at Doha, the capital on the east coast and a few small villages along that eastern coastline.

The oil is just about as far removed from these population centers as it could be and still be in Qatar.

Dukhan field . . . About the only geographical relief to Qatar's monotonous terrain are limestone outcrops that rise as high as 250 ft. along the peninsula's west coast. It was here that Qatar's light, 41.5°-gravity oil was found.

Dukhan's January 1940 discovery was completed for 5,000 bbl. daily from what Qatar Petroleum Co. calls its No. 3 limestone pay at 5,685 ft. The upper Jurassic limestone is the same as the Arab "C" pay found in Saudi Arabia.

Later drilling proved the No. 4 limestone to be a thicker, better producer, but the outbreak of the war forced suspension of development drilling in 1942. Active development wasn't resumed until 1948.

Today Dukhan field has 48 producing wells spaced along the 40-mile anticlinal structure and the field accounts for a steady 174,000-bbl.-daily average production. The No. 3 limestone pay averages 83 ft. thick and is found at about 6,000 ft. throughout the field. The No. 4 is 185 ft. thick and found 500 ft. deeper.

The shallower limestone production showed a marked pressure decline so completions in this pay were suspended in 1952. The bulk of Dukhan's production comes from the thicker No. 4 limestone where there has been no appreciable pressure drop.

An even deeper Jurassic limestone, the Uwainat, was found at about 7,500 ft. in 1954 and so far three observation wells have been completed in this formation.

The No. 3 limestone wells produce at 800 psi. wellhead pressure with a 700:1 gas-oil ratio. The wellhead pressure on the No. 4 wells averages 1,450 psi. with a 1,200:1 ratio.

Three separation stations, each with a series of horizontal separators, process the crude before it is moved into the pipeline system at Umm Bab for

OPERATOR of signal station talks by radio to incoming oil tanker.

TANKERS are guided into the offshore sea-loading berths at Umm Said terminal, using the vertical posts as line-of-sight markers.

Persian Gulf

pumping to the Umm Said terminal.

Each of the two existing separation stations, and a third under construction, is equipped with pumping units to move the crude into the main pipeline system to Umm Said. The stations at Khatiyah and Jaleha have been revamped to keep pace with the field's increased production.

Khatiyah is equipped with two Mather & Platt centrifugal pumps driven by 1,300-hp. gas-expansion turbines. The new pumps have a capacity of 85,000 bbl. daily. At Jaleha older pumps have been replaced by two Harland centrifugal pumps, each with a 40,000-bbl.-daily capacity. These also are driven by gas expansion turbines.

The Fahahil Separation station, in the center of the field, will have the same type of equipment as soon as it is installed.

The pipeline and terminal . . . The first 14 miles of the pipeline system eastward from Umm Bab is two parallel 14½-in. lines on the surface. The final 35 miles of the system is a single 20-in. buried line terminating at the Umm Said tank farm.

The 16 storage tanks, just 4 miles from the loading terminal, have a working capacity of slightly less than 2,000,000 bbl. of crude.

Loading from Umm Said's three sea berths is controlled from a single signal station overlooking a stretch of sandy beach with the berths just about 2,000 ft. offshore. By large terminal standards, Umm Said is not an elaborate setup, but with all three berths in use, the terminal can move almost 34,000 bbl. an hour into vessels.

The terminal loads an average of 27 tankers a month, but tidal conditions limit the terminal to vessels of less than 37-ft. draft.

The deep test . . . Dukhan field as it is known today is defined. Its producing wells are adequate to produce the 174,000 bbl. daily at the field's most efficient rate.

Efforts to find other oil-bearing structures in Qatar have proved disappointing. Two tests drilled in the center of the peninsula, Kharaib 1 and 2, in 1952 and 1953 found the Arab zones productive at Dukhan to be water bearing.

It was then that QPC took another look at its most favorable structure and decided on a well to look for a productive oil zone deeper than any now producing in the Arabian Gulf—on the Dukhan structure.

QPC knew pretty well what it would find down to 8,500 ft. Between this depth and 12,000 ft. it could make a reasonable prediction of the lithology from the known section in both Bahrain and Saudi Arabia. Nothing is known of the stratigraphy below 12,000 ft. except it is probably Paleozoic shales and sandstones.

QPC estimated the cost of the 16,500-ft. deep test at more than $4 million, with about half that figure earmarked for the equipment. This cost has undoubtedly skyrocketed because of labor troubles which suspended the drilling for several weeks in mid-May.

At mid-July the well was drilling below 9,958 ft., logging and coring throughout the section. Now below the known section, the crews are taking 50-ft. diamond cores every 200-300 ft.

Because the company wanted to protect the three known productive horizons the well penetrated and also have a reasonably sized hole at depth, an unusual casing program for a Middle East well was laid out. A 26-in. hole was drilled below 2,200 ft. to land 20-in. casing at that point. This was followed by 13⅜-in. to 5,440 ft. and 9⅝-in. to 8,000 ft. The 8,000-14,500-ft. section is being cased with 7-in. Plans are to drill the final 2,000 ft. of hole in a 5-in. liner. The 9⅝-in. and the 7-in. strings are P-110 grade casing.

The test may represent a last-ditch try for deep production on Qatar's best oil structure, but QPC figures it can always plug back to the No. 4 limestone and make a standard Dukhan producer out of its expensive wildcat if it finds nothing better.

Foreign Area Output Keeps Tumbling

- Gains in Iran offset by sharp declines in Kuwait and Venezuela. Syrian terminal is busy.

CRUDE OUTPUT in foreign areas of the free world slipped for the third consecutive month in May.

Declines in Venezuela and the Middle East sent output to the lowest level since last fall. Venezuela was off more than 120,000 bbl. daily, while Kuwait was down almost 150,000 bbl. daily. The Kuwait decline carried the whole Middle East to a lower level, despite an all-time record of 983,000 bbl. daily in Iran.

Banias, the Syrian terminal of the 30-in. branch of the Iraq Petroleum Co. system from Kirkuk field to the Mediterranean, exported its 100-millionth ton during the month. This amounts to more than three-quarters of a billion barrels. More than 5,000 tankers have loaded at the terminal since the 555-mile line opened 7 years ago. IPC's other Mediterranean terminal, at Tripoli, is fed by twin lines.

TREND OVER THE LAST YEAR

	Western Hemisphere, less U.S.	Middle East	Total Free World outside U.S.
1958			
May	3,587.5	4,081.6	8,434.5
June	3,678.0	4,156.8	8,654.2
July	3,777.0	4,247.2	8,832.6
August	3,828.4	4,334.0	8,971.5
September	3,769.8	4,535.2	9,120.8
October	3,891.3	4,482.3	9,177.5
November	4,037.8	4,472.1	9,309.5
December	4,119.9	4,446.2	9,371.4
1959			
January	4,311.6	4,369.3	9,449.5
February	4,453.9	4,426.1	9,649.7
March	4,220.6	4,634.2	9,680.7
April	3,910.4	4,646.4	9,396.5
May	3,779.0	4,611.9	9,222.3

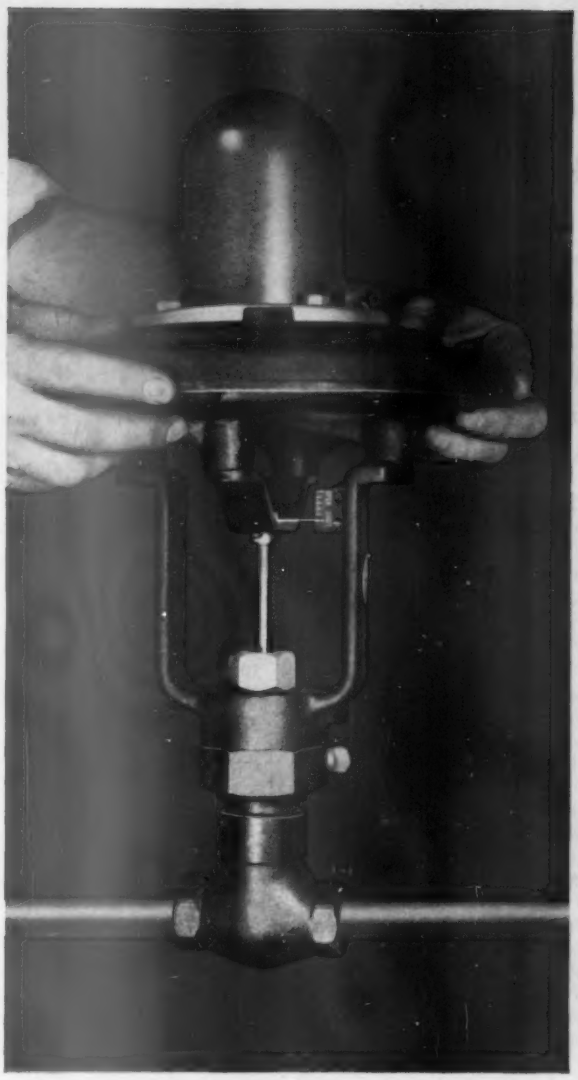
World-Wide Crude Production: Daily Average in Thousands of Barrels

Country—	May 1959	Apr. 1959	May 1958
Western Hemisphere			
Argentina	118.5	118.5	93.5
Bolivia	8.6	8.6	9.5
Brazil	53.1	53.1	45.3
Canada	440.0	441.0	405.2
Chile	17.1	17.1	15.5
Colombia	137.3	146.7	125.3
Cuba	0.5	0.6	0.9
Ecuador	8.1	8.1	8.6
Mexico	269.9	269.9	253.7
Peru	47.8	46.9	50.8
Trinidad	109.1	109.1	101.0
Venezuela	2,569.0	2,690.8	2,478.2
Total	3,779.0	3,910.4	3,587.5
Europe			
Austria	45.7	45.6	53.5
France	29.8	29.8	23.7
West Germany	98.5	98.5	85.6
Italy	31.0	31.0	31.3
Netherlands	33.4	33.4	28.7
United Kingdom	1.7	1.7	1.7
Yugoslavia	11.8	11.8	8.9
Total	251.9	251.8	233.4
Middle East			
Bahrain	45.0	45.1	40.2
Iran*	983.0	871.0	749.0
Iraq†	803.7	811.1	707.6
Israel	2.0	2.0	1.2
Kuwait	1,440.2	1,587.6	1,367.3
Neutral Zone	110.5	110.5	57.2
Qatar	169.0	169.5	172.7
Saudi Arabia	1,050.2	1,043.1	979.5
Turkey	6.5	6.5	6.9
Total	4,611.9	4,646.4	4,081.6

Country—	May 1959	Apr. 1959	May 1958
Other Asia			
British Borneo	107.0	107.0	104.0
Burma	10.5	10.5	8.8
India	8.5	8.5	8.5
Indonesia	340.0	350.0	310.4
Japan	6.7	6.7	7.1
New Guinea	4.4	4.4	3.0
Pakistan	5.9	5.9	5.9
Total	483.0	493.0	447.7
Africa			
Algeria	16.2	13.6	11.0
Angola	0.8	0.8	0.8
Egypt	56.9	58.9	56.2
Gabon	14.2	13.2	8.2
Morocco	1.8	1.8	1.5
Nigeria	6.6	6.6	6.6
Total	96.5	94.9	84.3
Free World			
Foreign	9,222.3	9,396.5	8,434.5
United States	7,220.0	7,256.0	6,233.0
Total	16,442.3	16,652.5	14,667.5
Communist Countries in Soviet Orbit			
Romania	235.0	235.0	227.0
Russia	2,490.0	2,490.0	2,230.0
Others	60.0	60.0	60.0
Total	2,785.0	2,785.0	2,517.0
WORLD TOTAL	19,227.3	19,437.5	17,184.5

*Includes estimated 5,000 bbl. daily from Naft-i-Shah field not operated by consortium companies. †Includes estimated 3,300 bbl. daily from Naft Khaneh field, operated by Iraq government.

Figures are from reliable industry reports or government sources. Estimates are made where complete reports are lacking.



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Computer control of internal reflux in fractionators

Extensive use of aerial cooling leads to some problems. For example, changing ambient conditions (such as a sudden rainstorm) can upset a fractionator through changes in the internal reflux rate. A novel and successful solution involves the use of a simple pneumatic analog computer.

BY D. E. LUPFER AND D. E. BERGER
Phillips Petroleum Co.
Bartlesville, Okla.

THE INTERNAL REFLUX computer control system has been successfully applied to a number of fractionators at a cost substantially less than would be required for good reflux temperature control. Tangible benefits from improved column performance appear as sizable reduction in reboiling steam consumption and in more uniform composition of valuable products. The immediate acceptance of this method of control within Phillips supports our belief that widespread application throughout the petroleum and chemical industry will follow.

The feasibility of computing a difficult-to-measure process variable for the purpose of automatic control is clearly demonstrated. The success of this simple computer control application has provided an impetus for the application of more complex automatic computer control systems.

Paper presented at ISA St. Louis meeting, 1959.

This study, design, and plant test work demonstrates clearly the value of isolating interacting control loops and regulating disturbances before their entry into large-scale plant equipment. The assistance and encouragement given research and development department personnel by the operating departments are gratefully acknowledged.

Small changes in the fractionator reflux temperature can induce disturbances to the extent that the major instruments used for automatic control of the unit must be detuned for the sake of stability. An oscillatory situation arises from the regenerative nature of the reflux loop. Unless the reflux temperature is closely controlled, the system will operate in an oscillatory manner. This situation can be observed on many fractionators.

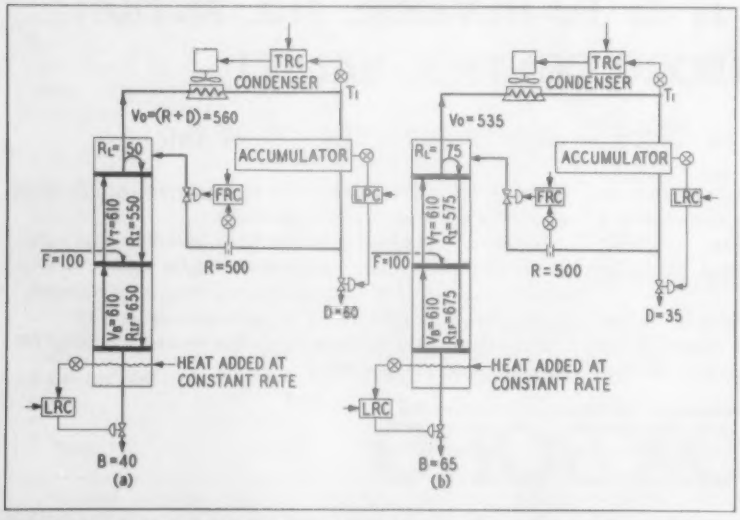
1. Effect of Varying Reflux Temperature

Figs. 1a and 1b are simplified mass-flow diagrams of a fractionator which can be used for explanation of events which follow a change in reflux temperature. Representation in this manner is only approximate since here it is assumed that the overhead and bottom products have the same heats of vaporization. This method is frequently used for ease of description and calculation of the separation.

As shown in Fig. 1a, 100 units of feed per unit time are introduced to the fractionator. The split is such that the overhead product rate D is 60 units and the bottoms product rate B is 40 units. The reflux flow R is maintained at 500 units. With a reflux rate of 500 and an overhead product rate of 60, the overhead vapor rate V_o must equal the sum of these two or 560 units (steady-statewise). Because the reflux stream enters the top tray at a temperature lower than tray temperature the descriptive effect is that it condenses part of the vapor V_T which enters the top tray. The amount condensed is that required to heat the cold reflux to the top-tray temperature.

It is assumed for purpose of illustration that the reflux temperature is enough lower than the tray temperature to condense 50 units of V_T. This condensed portion is illustrated as R_L. The liquid R_L will add to the reflux R to yield a top section internal reflux R_I of 550 units. Since the feed is shown entering the fractionator as liquid at a temperature equal to feed-tray temperature, it adds to the top section internal reflux R_I to produce a bottom section internal reflux R_{IF} of 650 units.

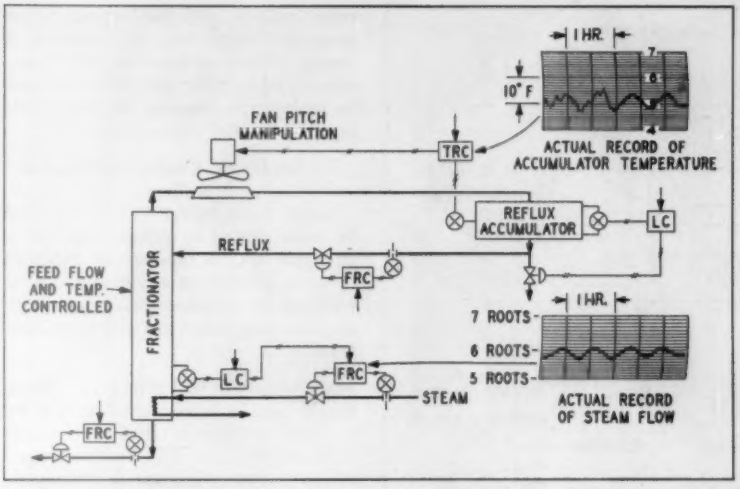
Enough heat is added by the re-



EFFECT OF REFLUX TEMPERATURE CHANGE on fractionator operation. Fig. 1.

Note: Pages Transposed

We got caught with our safeguards down when one of the early forms of this issue went to press, when an unfortunate transposition of pages occurred. The article the gremlins victimized was the excellent piece by Willis and Wynne beginning on page 78. To preserve context, read the pages in this order: 78, 79, 81, 82, 80, 83, 84.



TYPICAL FRACTIONATOR OPERATION showing result of poor reflux temperature regulation. Fig. 2.

boiler to vaporize 610 units of V_B which by difference will yield a bottoms product of 40 units. Since the feed stream enters as liquid at the same temperature of the feed tray, the same vapor rate V_T leaves the feed tray as enters. This then represents an over-all steady state, heat, and material balance for the fractionator.

What Happens When Reflux Temperature Changes

Assume now that the reflux temperature is lowered, but the flow rate R is maintained constant. The overall effect upon a fractionator which lacks composition control (temperature, physical property, or actual composition) or other compensating control methods is shown in Fig. 1b. Here it can be seen that the amount of V_T condensed has risen from R_L = 50 units to R_L = 75 units.

Since 25 units more of V_T are condensed, because of the colder reflux temperature, V_o will drop to 535 units. Since R is still maintained at 500 units the effect will be that the overhead product rate D will drop to 35 units. The internal reflux rate R_I will increase to 575 units and the lower section internal reflux rate R_{IF} will increase to 675 units. Since heat is added at a constant rate to reboil 610 units V_B the bottom product rate B will increase to 65 units. With the major controls as shown, this is the initial direction of the effect caused by a drop in reflux temperature.

Needless to say, product compositions will be drastically changed. More controls are usually used so that this effect is somewhat compensated. These composition and/or temperature changes within the fractionator are usually sensed and the reflux flow or reboiler heat manipulated in order to compensate.[2 4 5 6] However, note that the change must enter the fractionator before compensation can be effected.

System is regenerative . . . Inspection of the reflux loop discloses the regenerative nature of this system. If the reflux temperature drops as described here, the immediate effect is to increase the internal reflux rate R_I and decrease the overhead vapor rate V_o. A decrease in V_o decreases the mass flow through the condenser system which results in a further decrease in liquid temperature T_1, Fig. 1, downstream of the condenser. Unless a very good temperature control system is operating, T_1 will decrease.

This drop will reinforce the original drop in the reflux temperature so that feedback via the reflux route is regenerative, as permitted by the reflux accumulator dead time and lag. Changes in composition have the same type of regenerative feedback effect via the reflux loop. This is the reason that many of the fractionator transient test results found in the literature show no self-regulation for these systems.[3 4]

The combined effects of the regenerative reflux loop and the interactions between compensating fractionator controls result frequently in oscillating fractionator operation as illustrated in Fig. 2. The reflux loop is generally found to be the main contributor to situations such as illustrated here.

In the system shown, the kettle product rate is controlled at a constant value. Reboiler heat input is manipulated by the kettle level, and reflux temperature control is attempted through manipulation of the condenser fan pitch. The manipulation of the reboiler heat input compensates for the change in internal reflux which is induced by a change in reflux temperature.

2—Measurement of Internal Reflux

The immediate effect caused by a change in reflux temperature is to cause a change in the internal reflux flow rate. From the material and heat balances on the top tray, an equation can be derived which expresses the approximate internal reflux rate. This equation is approximate only in that it assumes all materials entering and leaving the tray exhibit the same heat of vaporization. The derivation of this equation is given below. From material and heat balance on top tray, Fig. 1a:

Material balance:

$$R + V_T = R_I + V_o$$

$$V_T - V_o = R_I - R \qquad (1)$$

Heat balance:

$$(H_{VT})\ V_T - (H_{Vo})\ V_o$$

$$= (h_{RI})R_I - (h_R)\ R \qquad (2)$$

where V_T = mass flow rate of vapor entering top tray. (lb./time)

V_o = mass flow rate of vapor leaving top tray. (lb./time)

R_I = mass flow rate of liquid leaving top tray. (lb./time)

R = mass flow rate of liquid entering top tray. (lb./time)

H_{VT} = enthalpy of vapor (V_T) entering top tray (B.t.u./lb. above reference plane)

H_{Vo} = enthalpy of vapor (V_o) leaving top tray. (B.t.u./lb. above reference plane)

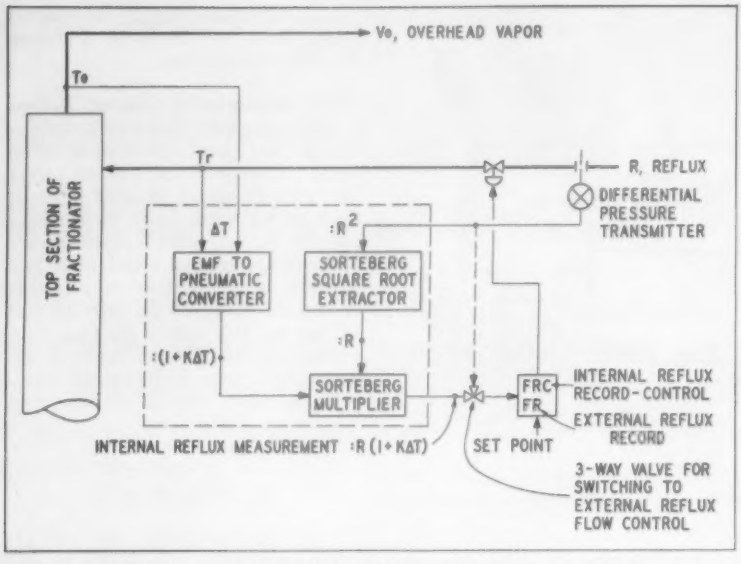
h_{RI} = enthalpy of liquid (R_I) leaving top tray. (B.t.u./lb. above reference plane)

h_R = enthalpy of liquid (R) entering top tray (B.t.u./lb. above reference plane)

Assuming that the liquid leaving the tray R_I and the vapor leaving the tray V_o are at the same temperature, an equation can be written which relates H_{Vo} to h_{RI}:

$$H_{Vo} = h_{RI} + \lambda \qquad (3)$$

where λ = heat of vaporization of liquid on the tray, (B.t.u./lb.). An equation can be written which relates the enthalpy of R_I (or liquid on tray)



SIMPLE PNEUMATIC ANALOG COMPUTER for control of fractionator internal reflux. Fig. 3.

to the enthalpy of R.

$$h_R = h_{RI} - C_p (T_o - T_R) \quad (4)$$

where C_p = specific heat of R_I (or liquid on tray (B.t.u./lb./°F)

T_o = temperature of liquid on tray (R_I or V_o)

T_R = temperature of R

Assume that:

$$H_{VT} = H_{Vo} \quad (5)$$

(Compositions are approximately the same)

Equations 1, 3, 4, and 5 can be substituted into Equation 2 to give

$$[h_{RI} + \lambda] (R_I - R) = (h_{RI})R_I - [(h_{RI}) - C_p (T_o - T_R)] R$$

which reduces to

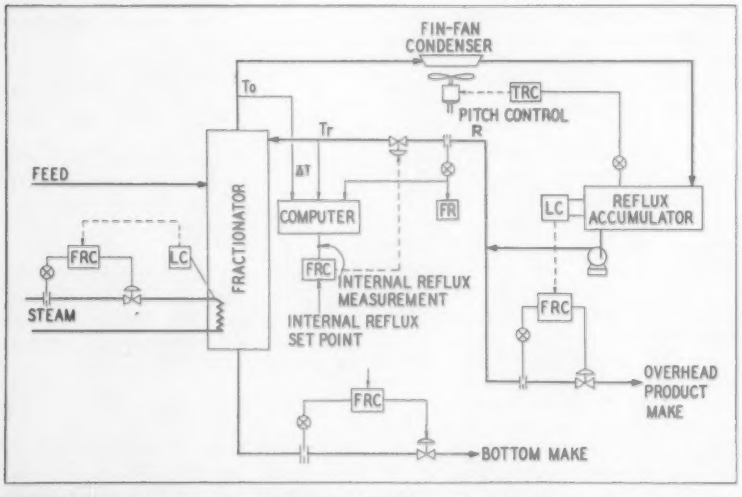
$$R_I = R [1 + (C_p/\lambda) (T_o - T_R)]$$

letting $C_p/\lambda = K$ and $(T_o - T_R) = \Delta T$

the following is obtained

$$R_I = R (1 + K \Delta T) \quad (6)$$

Equation 6 shows that the internal reflux can be computed from the measurement of one differential temperature ΔT and the external flow rate. The constant K is quite insensitive to composition changes for any one particular fractionator. It can be seen that a change in ΔT can be compensated by manipulating the external reflux rate to hold the internal reflux constant. Regardless of whether a change originates from within the column or without the internal reflux can be maintained constant by manipulating the external reflux rate.



FRACTIONATOR INTERNAL REFLUX CONTROL with simple pneumatic analog computer. Fig. 4.

3—Automatic Control of Internal Reflux

Since the external reflux flow can be manipulated to compensate for a changing ΔT, a number of methods or arrangements of equipment can be used for automatic control. These systems may be either pneumatic or electronic.

Manipulate external reflux . . . Equation 6 can be solved continuously by a simple pneumatic analog computer such as shown in Fig. 3. The output of the computer provides a continuous measurement of internal reflux flow rate. This is the measured variable for the internal reflux flow controller. The external reflux flow rate is manipulated to maintain the computer output constant.

This method of control is straightforward in that the computer can be thought of as a flow transducer. The closed loop has the fast response characteristic of a flow control loop, rather than the slower characteristics of a temperature control loop. Since internal reflux is the measured variable, it is recorded. Its value (setpoint) can be manipulated by cascade composition control or other controllers in the same manner that external reflux is normally manipulated.[2 4 5 6]

As shown in Fig. 3 there is only one major computing component for the solution of Equation 6. This is the multiplier. The square-root extractor is used only to obtain an air pressure which is proportional to the external reflux flow. The EMF to pneumatic converter is used to transduce ΔT to an air pressure proportional to the quantity $1 + K\Delta T$ of Equation 6. R for the equation is mass flow. To be theoretically correct, the volume flow would have to be temperature corrected. The fact that volume flow is not temperature corrected introduces little error since the density changes due to temperature excursions are small.

4—Results of Internal Reflux Control

The fractionator illustrated in Fig. 2 was equipped with the internal reflux control system as shown in Fig. 4. For this application the steam flow record serves quite well to evaluate this method of control. Small changes in internal reflux rate cause the kettle level to vary which in turn changes the steam flow rate.

No internal reflux control . . . Fig. 2 shows typical operation without inter-

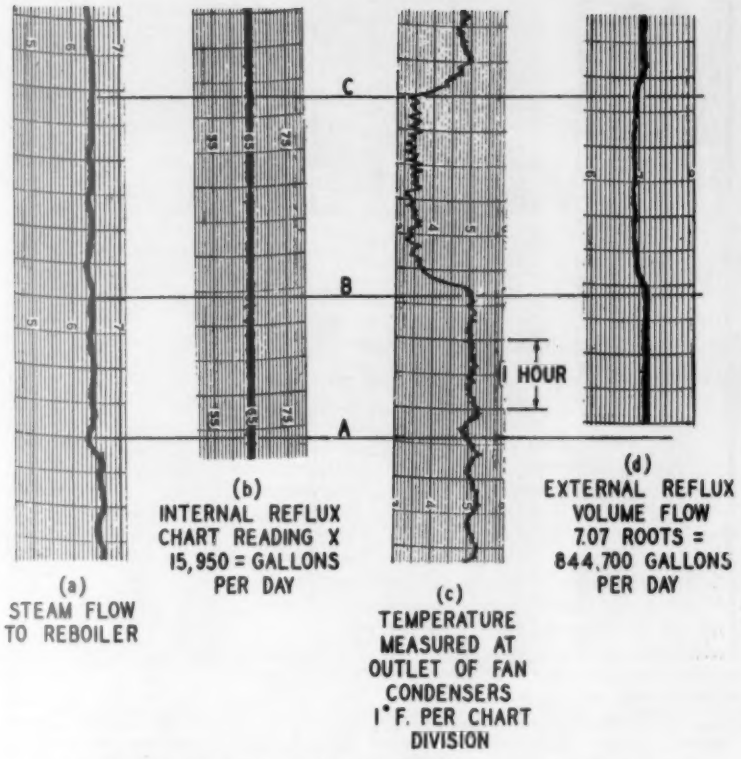


CHART RECORDS showing results of internal reflux control. Fig. 5.

nal reflux control. Fig. 5 shows the operation with control. Control was established at reference mark A. Shown between reference marks B and C is the external reflux flow correction which resulted from a large change in reflux temperature. The internal reflux remained constant. Very little deviation is seen on the steam flow record for this large temperature deviation.

Dynamically poor system . . . Inspection of the reflux temperature record, before control was established at reference mark A, Fig. 5, shows an approximate 5° F. oscillation at about two cycles per hour. Oscillations at the same frequency can be observed on the steam flow record. After control was established at point A, the reflux temperature lined out because of the more constant vapor load through the overhead condenser. The large reflux temperature change, between marks B and C, is typical of the changes caused by rainstorms and other sudden changing ambient conditions.

Without internal reflux control, this large drop in reflux temperature would have increased the internal reflux appreciably. Since the bottom product rate is on constant flow control, Fig. 4, and the kettle level is maintained by manipulating the reboiler heat input, the large increase in internal reflux would cause the reboiler heat input to increase. The amount of heat increase would be that required to reboil the increased flow of liquid entering the fractionator kettle. This type control, theoretically, would maintain the fractionator steady-state L/V ratios fairly closely. Dynamically, however, the operation is poor as can be seen in Fig. 2.

What happens? . . . The progression of events which follow a change in reflux temperature can be easily followed so that the resulting operation of the fractionator, Fig. 2, can be understood. Immediately following a decrease in reflux temperature the internal reflux leaving the top tray increases and the overhead vapor flow leaving decreases. This decreased vapor flow will eventually cause the reflux temperature to further decrease since the load through the overhead condenser has been reduced. As this effect is feeding back through the reflux loop, the change in internal reflux is progressing down the fractionator and the reboiler heat will be increased as this effect appears as a reboiler level increase. The heat input ultimately will increase to that amount required to return the overhead vapor rate to its original value.

However, a colder reflux will start entering the column due to the initial decrease in vapor flow. This will cause a further increase in reboiler-heat input. Since the original manipulation of the reboiler heat returned the overhead vapor flow to its original value, the effect will be to cause a rise in reflux temperature. It is apparent here how an oscillating situation is established. Many benefits can be gained by isolation of interacting loops and the regulation of disturbances before their entry into slowly responding systems.

Using internal reflux computer . . . Figs. 6 and 7 show the results of the internal reflux computer applied to the two-section column of Fig. 8. The intertower reflux flow rate and bottom-product flow rate can be used to evaluate operation of the internal reflux control. Fig. 6a shows a typical record of intertower reflux before internal reflux control was established. Fig. 6b shows a typical record of intertower reflux with computer control. For this evaluation it should be noted that intertower reflux is the internal reflux at that part of the column. Fig. 7 shows the improvement realized on the bottom-product flow rate.

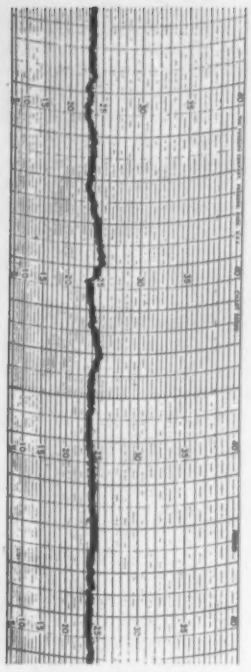
5—Installation of Internal Reflux Computer

Care must be exercised in the application of the computer control system to any particular fractionator. Location of the external reflux temperature measurement is quite critical if full benefit is to be realized. Measurement of the reflux temperature within the reflux accumulator should be entirely avoided since a measurement here is not representative of the temperature of reflux entering the column. Location of this temperature measurement in the reflux line at a long distance from the column entry should also be avoided. Many large column reflux lines are of such a length that transportation delays of 1 to 2 minutes are not uncommon.

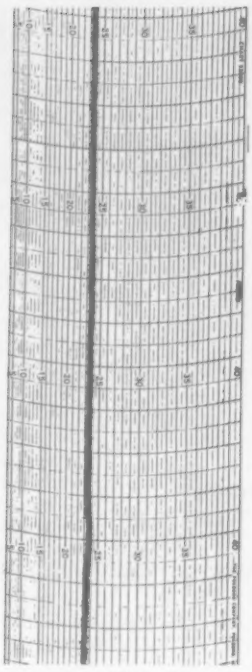
If the temperature measurement is mislocated in this manner, not only is the temperature drop in the line ignored, but the system will correct the reflux flow before the temperature change actually enters the fractionator. This then introduces an undesirable transient into the system. The temperature measurement should be located near the reflux entry.

If the internal reflux FRC, Fig. 3, manipulates the reflux valve directly, the valve should be equipped with a positioner since its dead spot may be the order of magnitude of the desired corrections. In some cases it may be desirable for the internal reflux FRC to reset a flow controller on the external reflux line.

A practical arrangement must be

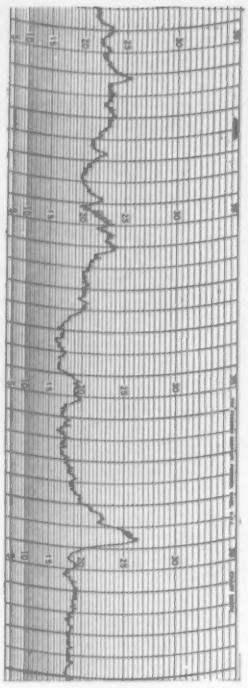


(a)
TYPICAL INTER-TOWER REFLUX FLOW WITHOUT INTERNAL REFLUX CONTROL

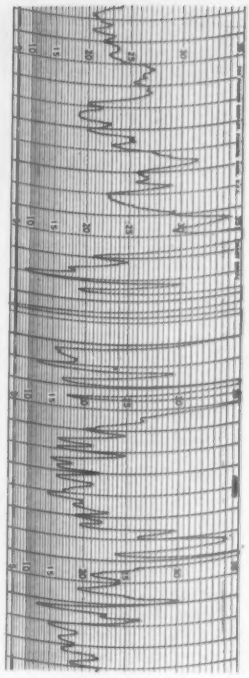


(b)
TYPICAL INTER-TOWER REFLUX FLOW WITH INTERNAL REFLUX CONTROL

TWO-SECTION fractionator. Fig. 6.



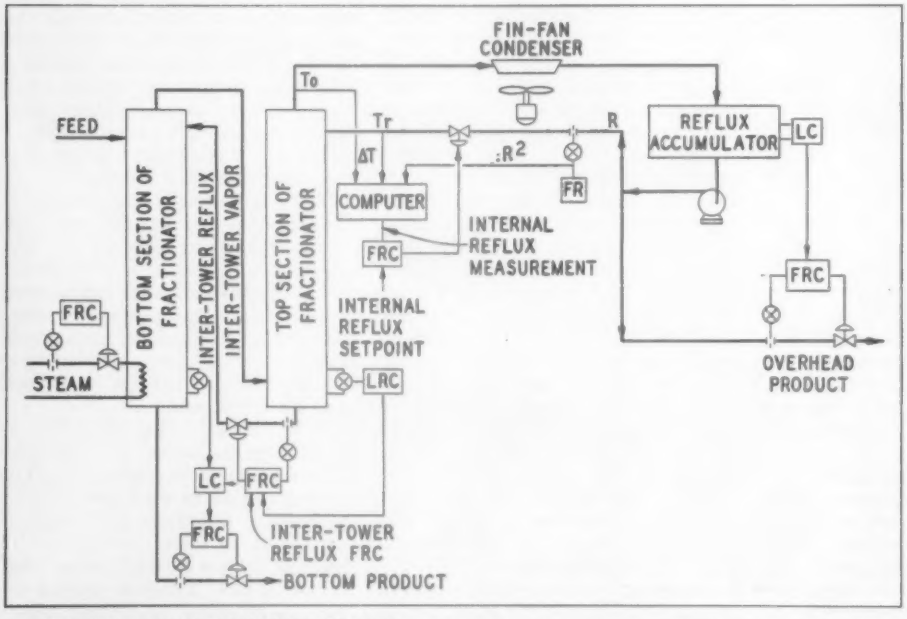
(b)
KETTLE PRODUCT FLOW RATE WITH INTERNAL REFLUX CONTROL



(a)
KETTLE PRODUCT FLOW RATE WITHOUT INTERNAL REFLUX CONTROL

KETTLE-PRODUCT flow rate. Fig. 7.

provided for switching the system from automatic internal reflux control to external reflux control so that maintenance and calibration checks can be performed to the computer system. A three-way valve can be installed as shown (dashed lines) in Fig. 3 so that the internal reflux flow recorder controller FRC will obtain its measurement directly from the external flow transmitter. Included in the internal reflux FRC is an extra recording pen which normally records the external reflux rate when the system is on computer control.



INTERNAL REFLUX COMPUTER CONTROL applied to a two-section fractionator. Fig. 8.

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Buffalo Petroleum's experience with

SONIC LOG APPLICATIONS

...in West Texas and New Mexico

" . . . its disadvantage may be eliminated in time but even in its present form the log is worthy of consideration in any logging program."

By MAX E. CURRY
Buffalo Petroleum Corp.
Fort Worth

THE ACOUSTICAL log is the end result of measuring and recording the velocity of a series of sound-wave signals traveling over a predetermined traverse. The log is known to the oil industry by various names—velocity logs, sonic logs, continuous velocity logs, and possibly several others.

Basic concepts . . . The principles upon which all acoustical logging devices are based are essentially the same, a transmitter located at the top of the sonde emits a sound signal of a frequency near 17,000 vibrations per second at a rate of 10 to 30 signals per second.

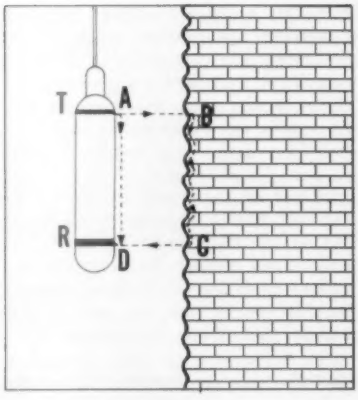
The instrumentation of the system permits a measurement of elapsed time required for each signal to travel over the desired traverse. The receiver acknowledges only the initial wave of each signal that reaches it. The elapsed time for the signal to travel the desired traverse is recorded continuously in microseconds per foot of travel, or, in some instances, as linear velocity in thousands of feet per second.

The variation of elapsed time over a fixed traverse for any given signal will be inversely proportional to the density of the material composing the traverse. It has been determined that the velocity of sound in very dense limestones and dolomites varies from 20,000 to 23,000 ft. per second, silica sandstones around 18,000 ft. per second, and in shales ranges widely around 12,000 ft. per second.

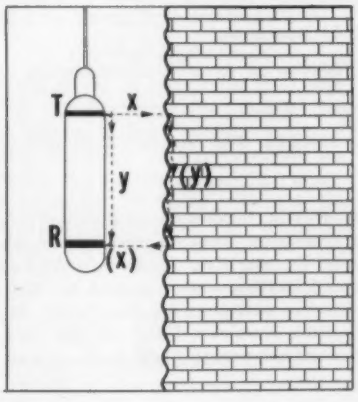
Most liquids encountered in oil-well boreholes, such as oil, water, and drilling fluids, transmit sound at or near the 5,000 ft. per second range. It is obvious that the variation of density within the vertical limits of an otherwise homogeneous formation will provide a similar variation in the recorded velocities of the signal as the sonde travels through that formation. Porosity is not the only characteristic of a formation that controls the density of any given volume of formation, but it is not difficult to imagine that it is the commanding parameter and, for the purposes of this paper, will be considered the only one upon which the velocity of sound through a formation depends.

Single receiver sondes . . . The traverse through which the measured signal travels is most important and, by maintaining a suitable distance between the transmitter and receiver, it is possible to select the signal that has made the desired traverse. In order to examine the formation opposite the sonde, the signal desired is obviously the one that has penetrated that formation. Referring to Fig. 1, the desired signal is that traveling traverse ABCD, but the traverse AD is shorter. It has been stated that liquids conduct sound waves at slower rates than do the materials from which rocks are composed. Therefore, the distance AD must be great enough to permit the wave traveling in liquid from A to B, in formation from B to C, and in liquid again from C to D, to require less elapsed time than for the same signal to travel the short-

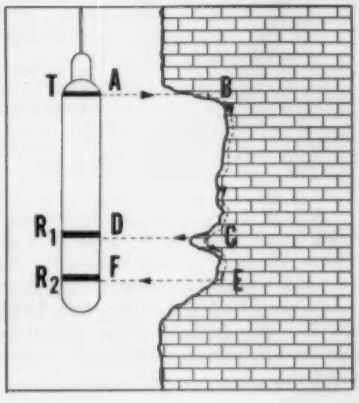
Single-receiver sonde. Path AD is shorter, but sound waves travel path ABCD in less time. Fig. 1.

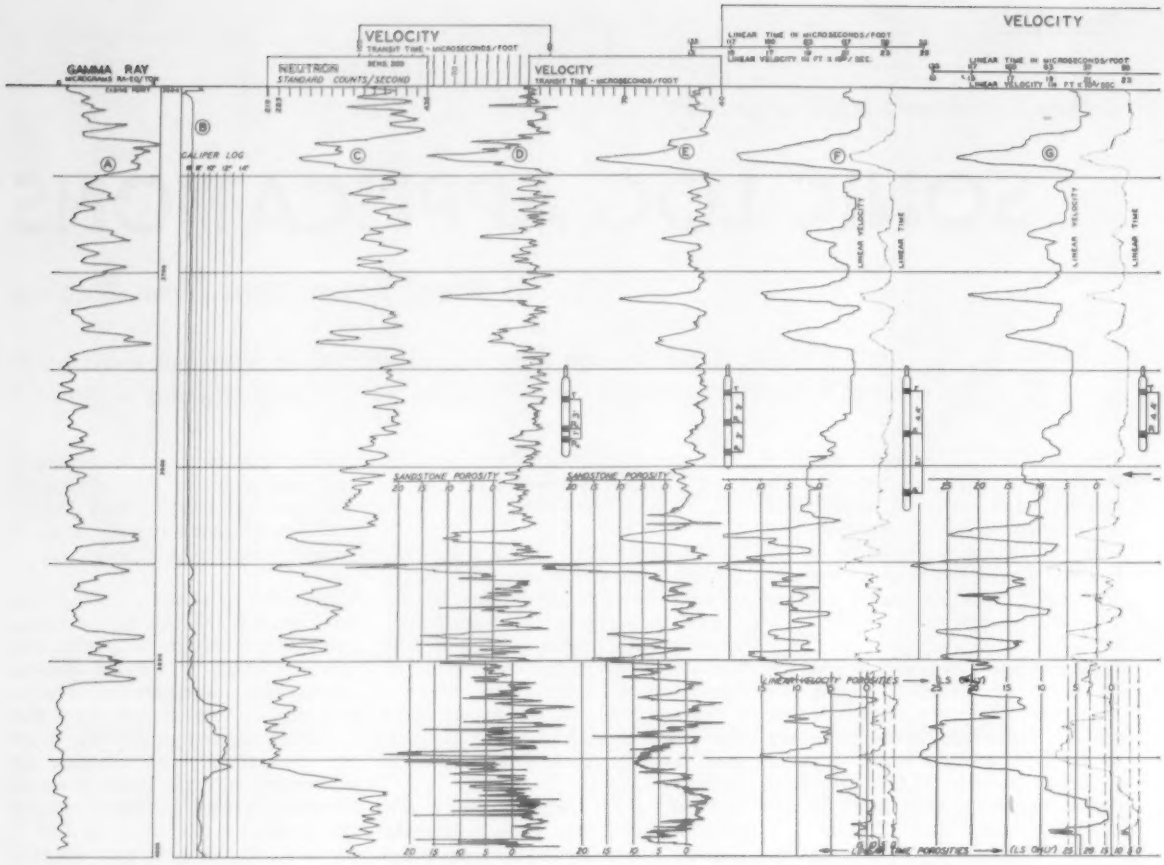


DISTANCE Y must be great enough with respect to distance x to permit wave through rock to reach receiver before wave following more direct path through well-bore fluid. Fig. 2.



A multiple-receiver sonde. Principal measurement is difference in time for wave to reach the two receivers, R_1 and R_2. Fig. 3.





er, but slower, route AD. The wide variation of velocities in varying media permits reasonable tool lengths to be used in the field.

Let the distance from the transmitter T to the receiver R in Fig. 2 be y ft. The distance from the transmitter to the formation and the distance from the formation to the receiver is x ft., and assume a signal velocity of 5,000 ft. per second through the liquid in the well bore. Then it will take 1/5,000 ft. per second or 0.0002 second for the signal to travel 1 ft. in the liquid, which is equivalent to 200 microseconds per foot of travel. For a formation capable of transmitting a signal at a velocity of 20,000 ft. per second, the time interval would be 0.00005 second, or 50 microseconds for the signal to travel 1 ft. Equating the travel times for the two paths shown in Fig. 2, we have

$$200y = 200(2x) - 50y.$$

Solving for x:

$$x = 0.375y.$$

Thus, for a spacing of 3 ft. between transmitter and receiver, a tool 4 in. in diameter could examine a dense limestone in a well bore no greater than 31 in. in diameter. It is obvious that the tool is not adequately spaced for recording shales and sands in holes of this diameter due to the lower velocities of the signal in these formations. Shales capable of transmitting sound at a velocity of 12,000 ft. per second cannot be correctly examined in holes of diameter greater than 28 in., a diameter not uncommon in washed-out shale zones.

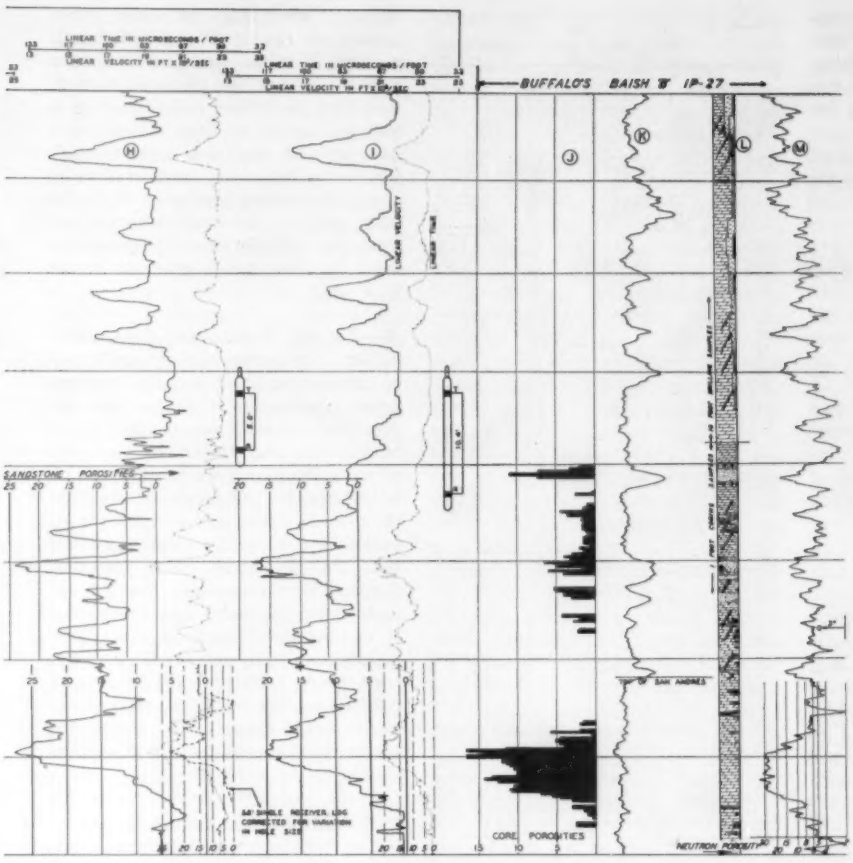
Multiple receiver sondes permit ex-

The author predicts . . .

that with further research and development, the acoustic log of the future will be able to:

- Analyze fluid saturation.
- Determine density of cement behind casing.
- Locate cement "tops."
- Determine presence and extent of formation fractures.

Max E. Curry is closely associated with drilling, production, and evaluation work in the Fort Worth office of Buffalo Petroleum Corp. He has worked as district engineer in New Mexico for Skelly Oil Co. and later for Buffalo Oil Co. In 1955 he was promoted to production and drilling superintendent for Buffalo's New Mexico district. When Buffalo Oil was purchased by Continental Oil Co. last year he joined the reorganized Buffalo Petroleum Corp. He has used the acoustic log described in this article to good advantage in his own work in the field.



IN THE EVALUATION of acoustical logging principles, several logs were run in the same well using different spacings. Some of these are shown here along with gamma ray, neutron logs and are correlated with porosites from core analysis. Fig. 4.

amination of very thin beds or zones of porosity by confining the vertical zone of examination to thicknesses corresponding to the distance between the two receivers. These are often as close as 1 ft. apart. The multiple receiver systems do not record elapsed time between the transmitter and receivers, but only record the time required for the signal to travel a distance in the formation equivalent to the distance between the two receivers.

In Fig. 3 the transmitter T emits a signal which makes the traverse ABC and continues through CD and CEF. Receiver R_1 picks up the signal from CD and receiver R_2 picks up the signal from CEF. The difference between the time R_1 and R_2 receive the signal is obviously the time required for the signal to travel between C and E and is the only portion of transit time recorded by the multispaced receiver log.

Fig. 3 shows that the relationship between the hole size opposite the transmitter and the two receivers is of little consequence, which greatly reduces the hole-size effect in multiple-receiver logging. Although the hole-size effect is eliminated between transmitter and receivers, it has been observed that a false reading will be obtained when a substantial difference in hole size exists opposite or between the two receivers. This is generally experienced as the sonde enters and leaves a shot hole or washed-out zone. The quality of the log is not seriously impaired unless the hole enlargement is fairly large and confined to a vertical distance equal to or less than the spacing between the two receivers. Readings of this nature do not reflect porosity and are easily detected when the log is accompanied by a single receiver acoustical log.

Practical Applications

Simplicity of interpretation is perhaps the most desirable characteristic of the acoustical log and makes it very practical for a universal log where economy in logging programs is required. In many instances the acoustical log is the only means by which the desired information may be obtained. Some of the uses to which these logs have been successfully applied are discussed below.

A—Logging Through Shot Holes

Many of the shallow oil fields in southeastern New Mexico now under study for secondary-recovery projects were completed prior to 1945 and most of the completion records of the wells were meager at best. Many of the leases in this area have changed ownership several times since completion and the present owners generally have insufficient data with which to make reservoir studies, develop equitable unitization factors, or perform remedial operations.

As most of the wells were completed in several hundred feet of open hole and the pay zones heavily shot with nitroglycerin, the variation in hole size and meager core data make the use of conventional well logs questionable and, in many cases, unsatisfactory for qualitative and quantitative analysis. The problem of resolving a satisfactory method of determining porosity and net feet of pay is a common one and of major importance in planning secondary-recovery projects in these areas.

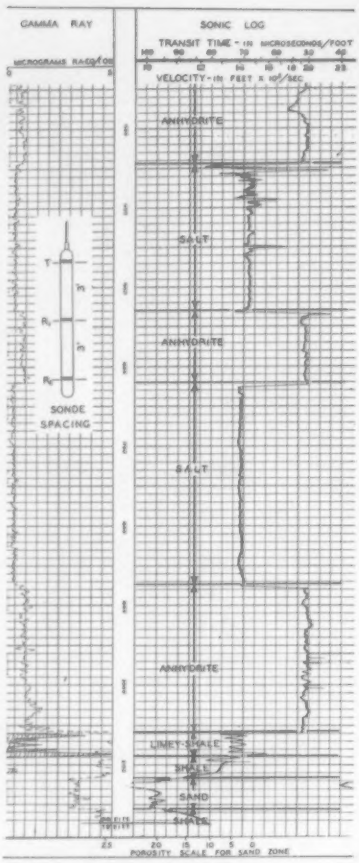
Field tests . . . In an attempt to evaluate the continuous acoustical logging principles for a possible solution to these problems, a program was set up to run acoustic logs of various spac-

ing and instrumentation in the Maljamar oil-pool area where core data and conventional logs were available.

Buffalo Oil Co.'s B2 Baish was chosen for the experimental logs because of the nature of its completion and the fact that its twin well, B27-IP Baish was cored in both the Grayburg and San Andres producing sections. The B2 Baish was originally completed at a total depth of 3,978 ft. in 1940 below 7 in. o.d. casing set at 3,605 ft. It was deepened in 1944 to a total depth of 4,110 ft. At the time of deepening, the well was shot from 4,034-4,090 ft. with 210 qt. and from 3,834-3,950 ft. with 330 qt. of nitroglycerin. Records show that the well has never been acidized. Operations for workover began by cleaning out the well to the total depth of 4,110 ft. with reverse-circulation equipment.

Different spacing used . . . The hole was kept full of lease crude throughout cleaning and logging operations. Several acoustic logs of varying spacing and instrumentation were run. Some of the more interesting curves obtained are shown in Fig. 4 where they are presented as correlated to the radioactivity logs, sample log, and plot of core data from the twin well. Curve A is a standard gamma-ray curve; B is a caliper log of the well bore showing a maximum hole size of slightly more than 13 in.; C is a scintillation-type neutron curve. The effects of borehole enlargement in the shot area as indicated by the caliper log are quite great on this curve and the log is of little value in this interval; D is an acoustic log spaced 3 ft. between the transmitter T and the first receiver R_1 and 1 ft. between the first and second receivers R_1-R_2. The extreme detail of this curve does not lend itself well to correlation, but permits a close examination of the thin beds or zones of porosity development; E is an acoustical log spaced 3 ft. between T and R, and 3 ft. between R_1 and R_2. The detail of this log is desirable as the correlation characteristics are satisfactory for conventional use without complete loss of fine detail, although the rather low porosity values do not agree very well with the core analysis of the twin well.

Curve F is an acoustical log spaced 4.4 ft. between T and R_1 and spaced 6.1 ft. between R_1 and R_2. The correlation value of this log is very good, as is the porosity determination, but much detail has been lost due to the rather wide spacing between R_1 and R_2. The spacing R_1 to R_2 controls the vertical interval through which the porosity values of



ACOUSTICAL LOG and gamma-ray run in a well in Delaware basin. Fig. 5.

the log are averaged and it is felt that the quality of this log could have been improved by inverting the spacing of the instrument (transmitter T 6.1 ft. from R_1 and receiver R_2 4.4 ft. from R_1). This would have eliminated some of the shot-hole effects and improved the detail of the log; curves G, H, and I are a series of single-receiver logs offered for comparison purposes only. These curves have not been corrected for hole size, except portions of H, as is required by single-receiver logs. These logs are of the type presently offered the industry for geophysical purposes and are probably the most familiar of all acoustic logs in use today.

Curve J is core data from Buffalo's 27-IP Baish B, the twin well to the 2 Baish B, taken by whole core analysis where possible and plotted on the same vertical and horizontal scale used on the linear-velocity curves F through I; curve K is a standard gamma-ray curve on the 27-IP Baish B; L is a sample log and M is a neutron curve of the same well. The unusually high porosity readings for the neutron curve in the San Andres formation may be due to the presence of gypsum, fracturing, or some other reason not readily determined, but is evident in other wells of Maljamar pool in some of the areas where neutron logs have been run. The hole is believed to be in gage through this interval as the well was cored through this formation and is considered to be competent when compared with the core analysis, however, it is out of character with the porosity determinations in other cored intervals in the well.

B—Logging Radioactive Formations

Very few formations are sufficiently radioactive to distort the conventional radioactive logs to any appreciable extent. However, the logging of Permian and Pennsylvanian sands of some Permian basin platform fields is affected by radioactive material in their composition, or by deposition of radioactive material in the formation near the boreholes from produced fluids. These formations may be examined by acoustical logs for porosity without distortion from radioactive influences. The acoustical log has been found to be helpful in logging open-hole formations that have previously been exposed to radioactive tracer surveys and carnotite cement slurries.

C—Lithological Determination

The lithology of dense formations is readily determined by the acoustic log. The velocity curve is helpful in some areas by supplementing the gamma-ray or self-potential curve to distinguish between sands and shales or between anhydrite and dense dolomite or limestone.

An example of this application in the dense evaporative horizons of the Delaware basin is shown in Fig. 5. The log shows anhydrites recording a velocity averaging 19,500 ft. per second, equivalent to a transit time of 51.2 microseconds per foot. The salt sections show velocities of 14,000 and 14,600 ft. per second, equivalent to transit times of 71.3 and 68.4 microseconds per foot. The limy shale section from 2,059-89 ft. is a dark, limy shale known in the Delaware basin as the "Black lime" and cannot be classified as either a lime or shale. The limy shale shows a velocity of 13,900 ft. per second and a transit time of 72 microseconds per foot. The two sandy shale sections between 2,089-2,117 ft. and 2,156 ft. to total depth show velocities of 10,700 to 13,000 ft. per second, equivalent to transit times of 93.2 and 77 microseconds per foot. The porosity scale shown at the bottom of the illustration was determined for the Delaware sand section between 2,117 and

2,156 ft. The calculated porosity ranges between 23.5 and 18%, well within the range of porosities expected for this sand. It is of interest to note that the spacing for this log is 3 ft. between the transmitter and the first receiver and 3 ft. between the two receivers. The characteristic of the acoustic curve at the top and bottom of the first salt section appears to be the result of false readings obtained as the sonde enters and leaves an enlarged section of the borehole, suggesting that the upper salt section was probably dissolved or washed out to some degree, although the characteristic of the curve in the second salt section reflects constant hole size through that interval.

D—Well Correlation

The acoustic curve is similar in character to the resistivity curves of electric logs and is easily correlated with that curve and the neutron curve of radioactivity curves. The acoustic curve is particularly helpful in correlation work where long sections of interbedded sands and shales of confirmed velocity variation are present in an area where an economical logging program is demanded. A combination of the self-potential curve or gamma-ray curve with the acoustical curve should provide ideal correlation characteristics in most areas of West Texas and Southeast New Mexico.

E—Evaluation of Seismic Data

It has been the practice in recent years by many operators to run single-receiver continuous-velocity logs in deep exploratory wells drilled in new areas prior to running each string of casing for the purpose of evaluating and correcting the results of reflection seismic interpretations, although the majority of operators are now using the multiple-receiver logs for this purpose. The acoustical log and its interpretation has been primarily a seismic tool and much research is still in progress in adapting various phases of acoustical-logging technique to seismic applications. However, it is suggested that, whenever possible, continuous-velocity logs run primarily for seismic work should be obtained with multiple-spaced receivers so they may be utilized by the field geologist and engineer for well completion and by the reservoir engineer for evaluation purposes.

Discussion

The acoustic log is a most important contribution in logging technique and great advancement may be expected in the near future by better instrumentation, better interpretation techniques, and in the presentation of the recorded curve. It is possible to run and record simultaneously curves of two or more spacings at the present time. The desirability of such a log is obvious. As an example, assume a single transmitter and three receivers spaced 4, 5 and 7 ft. from the transmitter. It is then possible to record a single-receiver curve with either of the receivers and simultaneously record multiple receiver curves of 1, 2, or 3 ft. spacing. The 1 ft. spaced curve would provide fine detail, the 2-ft. or 3-ft. curve would provide good detail and excellent correlation characteristics, and the single-receiver curve could be used for confirming the interpretation of the shorter spaced multiple-receiver logs and helpful for seismic interpretation purposes. The cost of such a log would be in line with comparable electric and radioactive logs.

Experimentation with various spacings of receivers on multiple spaced logs indicates that a spacing of 5 to 6 ft. between the transmitter and the first receiver is desirable where enlarged hole size may be suspected. The spacing between the receivers is dependent upon the purpose of the log, but a spacing of 2 to 4 ft. is applicable for most requirements. The spacings discussed here would be very near those required for a universal log, one to fit unknown conditions as well as recording workable logs in "in-gage" holes.

Much has been said on the advantages of the acoustical log, but we must recognize the disadvantage or undesirable characteristics, some of which are listed below:

- The log must be run in open hole.
- It must be run in liquid over the logged interval.
- Variable parameters other than porosity, such as pressure, saturating fluid and many others, slightly affect the log.
- At the present time fewer people are familiar with the interpretation of the log than other types of logs.

It is believed that these disadvantages may be eliminated in time, but even in its present form the log is worthy of consideration in any logging program.

Acknowledgments:

The contribution of time, expense, personnel, and equipment by Schlumberger Well Surveying Corp. and Empire Geophysical, Inc., is greatly appreciated, and the technical assistance given by Jim Reinders, Schlumberger; and C. H. Thurber, Empire Geophysical, Inc., has been most helpful, indeed. Few data on acoustical logging in shot holes would have been available to this article without the help and cooperation of these gentlemen. Particular appreciation is extended to Buffalo Oil Co. for the use of its wells, well files, personnel, equipment, and encouragement to gather the data required by this paper.

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BOOKS

OIL DIRECTORY OF TEXAS, 1959. Published by R. W. Byram & Co., Drawer M., Capitol Station, Austin. 355 pp. $15.

This directory lists 6,171 Texas oil producers, 2,654 gas producers, 165 oil-purchasing and transporting companies, 351 gas-purchasing and transporting companies, 69 refineries, 210 gasoline plants, 15 carbon-black plants, 32 cycling plants, and 129 repressuring plants, all in Texas.

The directory also lists officials of the companies and plants, addresses, and phone numbers when possible.

OIL-WELL CEMENTING PRACTICES IN THE UNITED STATES, published by the American Petroleum Institute. Sponsored by the committee on drilling and production practice of the API's Division of Production and written by committee members.

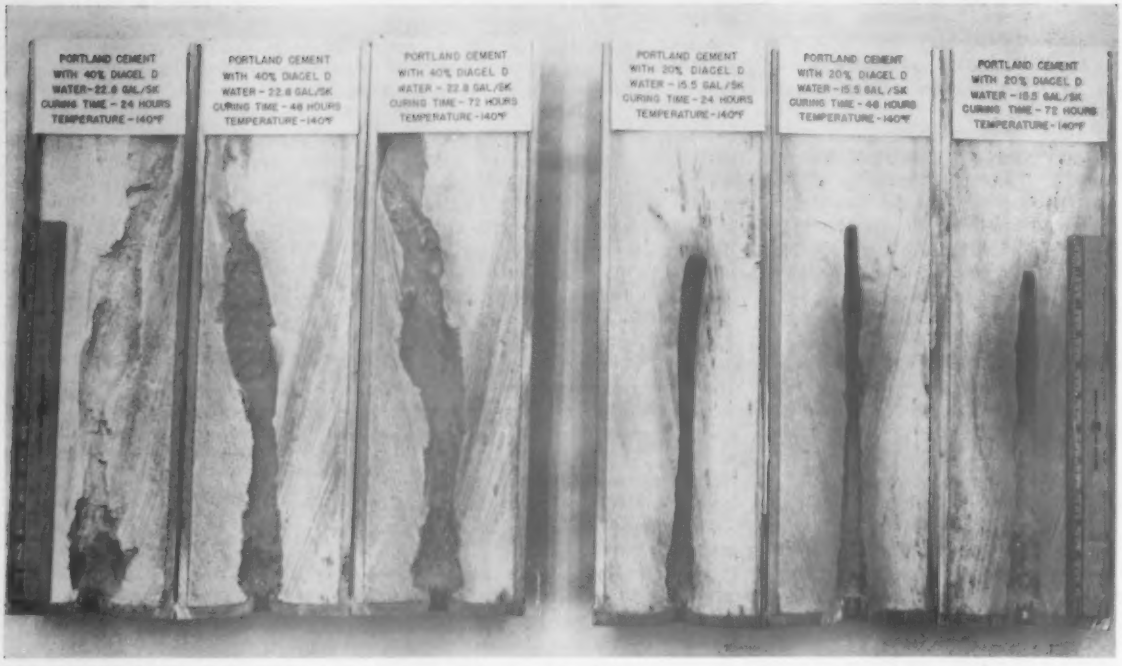
This carefully documented volume contains most of today's knowledge about well-cementing materials and operations. It contains an absorbing history of oil-well cementing which should be of interest to all in the drilling and producing phases of the industry. It also includes highly technical chapters on the chemistry of cements and the effect on cements of such things as temperature and additives.

This book represents the best of information collected from the industry's outstanding cement specialists. As a result, its chapters on planning and conducting casing-cementing jobs are proved and dependable. Its recommendations on squeeze cementing are those most likely to lead to successful jobs.

Also included in the volume is an exhaustive bibliography of the significant printed matter about oil-well cementing since its inception. Another chapter deals with the regulations affecting the manner in which wells are cemented.

Not an API standard, this book still ranks in value with such widely accepted API publications as "Principles of Drilling Mud Control" and "Treating Oil Field Emulsions."

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.



COMPARISON is afforded in the photo above and that on the facing page of the perforation characteristics of 20 and 40% diatomaceous earth elements with those of neat cements cured at 140° F.

Diatomaceous earth cures lost

THERE HAS BEEN a change of opinion in the drilling industry about how much strength is actually necessary in cements for casing jobs. Generally, strength requirements have been revised downward.

As a result, low-density cements which ordinarily have less strength than other types have become acceptable. The lightweight slurries are proving a needed solution to the problem of lost circulation while cementing casing. Through the use of these slurries, it is now possible quite often to cement casing in a single stage where two or more stages were necessary before.

The lightweight slurries have far better perforating characteristics than do the heavier cements. For this reason, it is neither necessary nor desirable to "tail in" a production string with a heavier slurry.

This article is a condensation of a paper presented at the 1959 meeting of API Division of Production's Mid-Continent district, Amarillo, under the original title: "Diatomaceous Earth—Your Best Bet for Maintaining Circulation While Cementing Casing."

Most often, the lightweight slurries alone are adequate to maintain circulation. That is, if there has been no loss of circulation before cementing, there is little to be gained by adding bridging material to the lightweight slurry. Where bridging material is necessary, small concentrations—up to 5 lb. per sack of cement—have proved most successful.

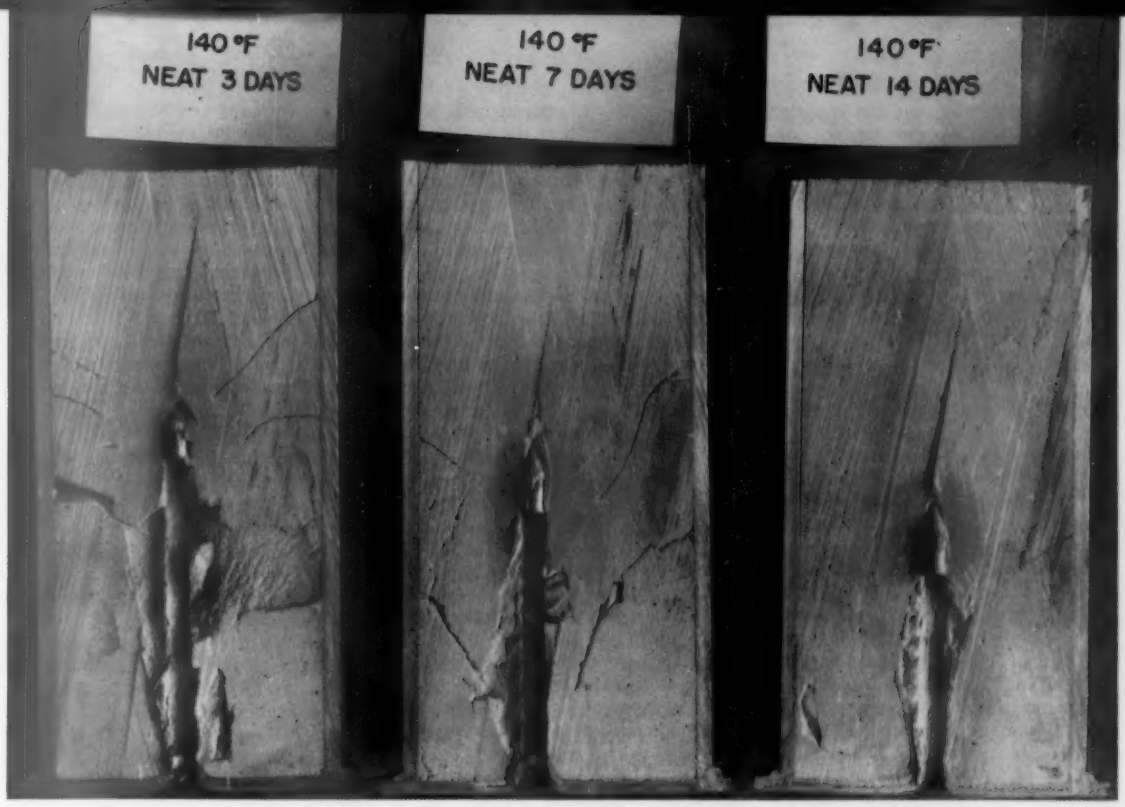
Of the available materials to make lightweight slurries, diatomaceous earth has much to recommend it. When compared to other materials slurried to the same density, those made with diatomaceous earth are stronger. Moreover, such slurries, being low in aluminum content, improve the resistance of all cements to deterioration by corrosive waters. Other light materials do not improve this resistance.

Where there have been failures of the cements, far more can be traced to excessive water content than to insufficient strength. It must be remembered that every type of cement formulation has a particular water-to-cement ratio that should not be exceeded. This includes lightweight and regular slurries.

How to prevent loss . . . There are two general methods to combat lost circulation while cementing. They may be used singularly or together. If mud or cement is lost primarily because an overbalance of formation pressure is sufficiently large to fracture the formation, a low-density cement is used. On the other hand, if the formation contains existing fractures, bridging materials are used in the cement slurry.

Some weak formations contain natural fractures. In these cases it is desirable to have a low-density cement containing a bridging material.

Many times the density of the cement slurry is decreased by increasing water-to-cement ratio. Actually, there is a very narrow range of densities to which neat cements should be slurried. For most neat cements, this density range is in the order of 1.5 lb. per gal. with a minimum density of 15.4 lb. per gal. for API Class A cements, and approximately 16 lb. per gal. for



NEAT-CEMENT tests were made on specimens only 14 in. long. See Table 6 for comparison of actual depths of penetrations in the three systems shown on this and the facing page.

circulation in cementing casing

Lightweight slurries are proving helpful in maintaining circulation while casing is being cemented. These slurries frequently make possible cementing casing in a single stage, instead of in two or more.

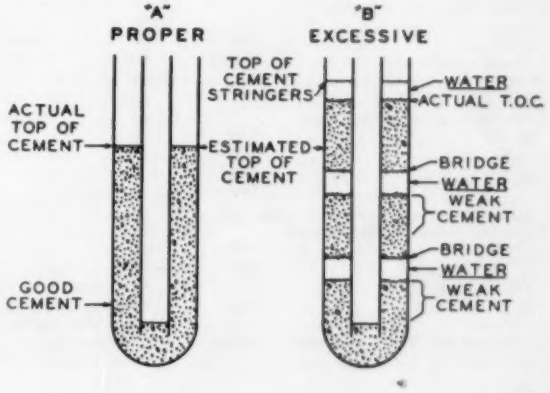
BY A. J. WILLIS
Phillips Petroleum Co.,
Great Bend, Kans.,
and
R. A. WYNNE
Drilling Specialties Co., Tulsa

API Class D, E, and F cements.[1] The proper density range and thus the amount of mixing water might vary with different kinds and different brands of cement. The amount of mixing water required will depend to a great extent upon the fineness of grind of the cement used.[3]

Channeling not to blame . . . One of the major causes of cement failures is excessive water-to-cement ratio. The effect of improper water-to-cement ratio is shown in sketch. Diagram A shows a casing cemented with cement having a proper water-to-cement ratio. Diagram B shows the effects of cement having excessive water-to-cement ratio.

Assume in both cases A and B that a 5½-in. casing is cemented in an 8¾-in. hole. In both cases 1,100 sacks of cement were ordered out for the job. In Diagram A the cement was mixed to 15.8 lb. per gal., and in Diagram B the cement was mixed to 15 lb. per gal.

Assuming the hole was to gage and no loss of circulation, the fillup



EFFECT of improper water-to-cement ratio is shown here.

low strengths bring up the question of the strength requirement of oil-well cement. Like any other part of the equipment or practice used in drilling or completing a well, the cement should be engineered for the job at hand. Of course, this does not answer the primary question regarding the strength for a particular job but does indicate that any one of a number of different values which has been used is proper depending upon the job.

One way to evaluate this problem is to check the strengths of some cements which have been used. An oil-well cement containing 1 cu. ft. of improved perlite to one sack of 50-50 fly-ash cement with 4% bentonite having a density of 12.6 lb. per gal. has a 24-hour compressive strength of 210 psi. when cured at 140° F. (Table 7). If this cement is mistakenly run at a lower density or if it is run in a well of lesser temperature, much lower strength values will result. Yet this cement blend has been run successfully under these conditions.

All other cements in Table 7, except the same formulation with 8% gel, have greater strengths than the subject blend. One might conclude, then, that they had sufficient strength, yet he would not want to sidetrack off of any of them. Many times operators have used cements having strengths far less than what they believed.

If low-strength cement is left behind a surface or protection casing, it is a good idea to "tail in" with 50 to 100 sacks of neat cement for additional strength. If, on the other hand, the casing is a production string, it is advisable to leave the weaker cement with better perforating characteristics around the shoe.

TABLE 8 — COMPRESSIVE STRENGTH OF 40% DIACEL D CEMENT CONTAINING BRIDGING MATERIAL

Bridging material:	Compressive strength, psi.*
0	380
Walnut shells, lb. per sack:	
½	320
1	370
1½	360
2	380
Cellophane scrap, lb. per sack:	
½	350
1	330
1½	305
2	290
Improved perlite, cu. ft. per sack:	
⅛	370
¼	330
½	315
1	280

*Twenty-four-hour compressive strength when cured at 140° F.

Proper water-to-cement ratio is far more important than strength to the success of a cement job.

Of the major cement formulations discussed, those containing diatomaceous earth, pozzolans, and expanded perlite retard the deterioration of API Class A cement in brackish and sulfate-containing waters. Those containing bentonite accelerate the deterioration of all cements in these corrosive waters. Gilsonite has little or no effect upon the resistance of the basic portland cement. Only diatomaceous earth, of these admixes, will improve the resistance of a sulfate-resistant cement to corrosive waters.

Bridging Material

Certain types of lost circulation cannot be stopped by the use of a lightweight cement alone. These lost-circulation zones contain larger cracks which must be filled with a bridging material before circulation can be restored. Some types of crevices are filled most readily with flakelike material, whereas others are better sealed off with granular material. The experience gained while drilling should assist in determining which type of material to add to the cement. Recent experiences show that very good results are obtained by adding combinations of flakelike and granular material.

Small amounts of lost-circulation material have little effect upon the strength of cement (Table 8). Some preliminary laboratory experiments indicate that the flakelike material gives optimum results at about 1½ lb. per sack of cement; granular material works best at about 2 lb. per sack of cement; bituminous material works best at about 3 to 5 lb. per sack of cement; and cellular material, such as expanded perlite, seals at low pressure but the seal is broken when pressure is applied. However, this may not be true in actual practice since the depth of the fracture can be considered almost infinite as compared with the 1-in. depth of the fracture in the laboratory apparatus.

TABLE 9—PROPERTIES OF DIACEL D AND POZMIX "A" CEMENTS SLURRIED WITH SATURATED SALT WATER

Gel, %—	Density, lb. per gal.	Bleeding (%)*	Compressive strength, psi.†
DIACEL D:			
40	12.45	1	420
40	12.2	3	260
60	12.1	..	270
60	11.0	..	200
50-50 Pozmix A:			
8	13.9	3.5	280
12	13.85	2.0	200
16	13.6	2.5	160

*Per cent supernatant water in 250-ml. mixing cylinder filled with slurry for 3 hours. This value should not exceed 1 for a stable slurry. †Twenty-four-hour compressive strength when cured at 140° F.

Combinations of density-decreasing additives and bridging materials have been very satisfactory in the field.

Normally, the compressive strength of the cement when tested at temperatures less than 140° F. can be considered about 50% greater if a suitable accelerator such as calcium chloride is used.

Salt-Water Cements

Zones of lost circulation many times lie immediately above and below salt zones. When cementing through these salt formations, cement prepared from fresh water tends to leach away some of the salt, thus giving a poor cement-formation bond. Therefore, it has become a common practice to use saturated salt water to slurry cement to be used through salt sections.

Because saturated salt water weighs about 10 lb. per gal. as compared to about 8.3 lb. per gal. for fresh water, cement slurries using saturated salt water are invariably of higher density than those using fresh water. It therefore becomes increasingly difficult to obtain good cement slurries having low densities if the slurries are prepared from saturated salt water. If, for example, a 50-50 Pozmix A cement containing 8% gel was slurried to 13.9 lb. per gal. with saturated salt water, an unstable slurry would result (Table 9). With fresh water this same slurry is recommended at a density of 13.1 lb. per gal.

Naturally, as the amount of water in a cement slurry is increased, such as is possible with a diatomaceous earth cement slurry, the relative increase in density resulting from use of salt water in place of fresh water becomes more pronounced. For instance, a 40% diatomaceous earth cement which normally would have a density of 11 lb. per gal. has a density of 12.5 lb. per gal. when slurried with saturated salt water. A 60% diatomaceous earth cement slurry density is increased from 10.3 to 12.1 lb. per gal.

One striking feature of these slurries containing diatomaceous earth with large amounts of salt and water is that the strength of the cement slurried with saturated salt water is greater than the strength of the cement slurried with fresh water. For most cements the strength when slurried with saturated salt water is only about half that when slurried with fresh water.[10]

Field Case Histories

A small field in Wyoming gives a striking example of the evolution of

would be 5,000 ft. in Diagram A and 5,582 ft. in Diagram B. If, however, the engineer figuring the job used the same fillup factors in both cases—that for 15.8 lb. per gal. slurry—the top of the cement in Diagram B would be 582 ft. higher than expected. If a temperature survey was run, the top of the cement in Example B would be higher than predicted by the engineer. He would probably consider channeling as the explanation for the high top of cement.

If the hole was subsequently perforated below the top of the cement and water was produced, or if at a later date the casing corroded below the top of the cement, the engineer would undoubtedly be even more convinced that he got a channel job. Actually, no channel job whatsoever may have occurred.

Cement which is mixed with an excessive water-to-cement ratio will bridge and form water pockets throughout the cement column. Immediately below these water pockets is generally an area of weak cement. These bridges, water pockets, and weak-cement areas give indications that many times are interpreted as channeling. This is in no way to say that channeling does not occur. Rather, it is maintained that, in many cases of so-called channeling, excessive water-to-cement ratio may have been the culprit.

No substitute for portland . . . Because the density change with a change of water-to-cement ratio for neat cement is rather limited, additional means for decreasing the density of oil-well cements were sought. One of the first things that comes to mind is the use of an entirely different type of cementitious system. A number of such systems have been advanced and, although theoretically sound, have been economically unsuccessful. However, such a system still presents a very real possibility.

The more general approach to low-density cement is to modify neat portland-cement slurries. This may be done by diluting the cement solids with solids of lesser density or by adding a solid diluent which permits greater proportions of water to be added without separation of solids. Of course, part of the water may be substituted with a liquid of lower density. Probably the best approaches to this problem are combinations of these techniques.

Bentonite came early . . . One of the first materials to be used to decrease the density of cements was bentonite. This material is still widely used. Bentonite is used in cement primarily because it absorbs great amounts of water.[3 4 5 6]

When bentonite was first used, high strengths were considered a primary requirement for cement. Because bentonite, as all other lightweight additives, decreases the strength of cement, early concentrations were held to about 2 or 3%. These small percentages of bentonite did more for the workability of cement than they did to reduce density.

As a more scientific approach to the use of cements in oil wells was developed, strength figures were revised downward. This allowed the use of greater and greater percentages of bentonite which resulted in greater reductions in the slurry density with, of course, a corresponding reduction in strength as shown in Table 1.

The lower strengths obtained with bentonite cement enabled perforation with less bullet resistance and less shearing. Actually, it is probably not compressive strength but resiliency which dictates the ease with which a cement can be perforated. Normally, all low-strength cements are quite resilient.

The use of high percentages of gel has serious disadvantages. As the amount of bentonite in the cement is increased, the susceptibility of the cement to attack by corrosive water greatly increases. Attempts have been made to correct this situation by including pozzolanic material in the gel cement.[7 8] Although pozzolans increase the resistance of gel cements somewhat, they are still quite susceptible to this attack.

Whereas the use of bentonite is primarily the approach of adding a solid diluent which permits greater proportions of water, the use of pozzolans is primarily addition of a solid diluent having density less than that of portland cement. The combination of these two materials further decreases the set strength of the cement (Table 2).

TABLE 1—PROPERTIES OF BENTONITE CEMENTS*

Gel, per cent	Density, lb. per gal.	Yield, cu. ft. per sack	Compressive strength psi.†
0	15.4	1.22	4,060
2	14.7	1.36	2,960
4	14.1	1.53	1,830
8	13.3	1.82	1,170
12	12.6	2.19	620
16	12.0	2.60	270

*From Saunders and Nussbaumer.[4] API Class A cement. †Twenty-four-hour compressive strength when cured at 140° F.

TABLE 2—PROPERTIES OF 50-50 POZ-MIX "A" CEMENT CONTAINING BENTONITE*

Gel, per cent	Density, lb. per gal.	Yield, cu. ft. per sack†	Compressive strength psi.‡
2	14.15	1.26	1,125
4	13.6	1.43	605
6	13.3	1.53	540
8	13.1	1.64	420

*From "Pozmix Cement."[13] †Yield in cubic feet per sack of 50-50 mix. ‡Twenty-four-hour compressive strength when cured at 140° F.

Perlite density changes . . . Sandwiched between the development of gel cements and gel-pozzolan cements was the development of cements containing expanded perlites. Expanded perlite, because of its cellular, bubble-like structure, tends to float on neat-cement slurries. These tiny glass bubbles have a density of about 15 lb. per cu. ft. By replacing part of the cement with this lightweight diluent, low-density cements are possible.

The addition of 2 to 6% bentonite to the cement greatly reduces the tendency for expanded perlite to float and produces a slurry in which the perlite remains in much better dispersion throughout the cementing job.

Slurry densities with expanded perlite under surface conditions are misleading. The tiny glass bubbles break down under pressure, allowing fluid to saturate the interior of the particle. The slurry weight of the cement containing this material increases as it is pumped into the well. Slurry weights at the surface and at 3,000 psi. are included in Table 3.

Because of the inherent disadvantages of expanded-perlite cements, a blend of expanded and unexpanded perlite was introduced for use in cements.[9] This material, designated as improved perlite, has very little advantage over expanded perlite (Table 4).

Diatomaceous earth enters . . . The lightweight cement systems discussed thus far cover the density range down to about 12.5 lb. per gal. A different material was necessary to extend this density range to lower values. For

TABLE 3—PROPERTIES OF EXPANDED PERLITE CEMENT*

		3,000 psi.	
Gel, per cent	Surface density, lb. per gal.	Density, lb. per gal.	Yield, cu. ft. per sack
One sack cement—½ cu. ft. expanded perlite			
2	13.0	13.8	1.68
4	12.7	13.4	1.84
8	12.3	12.9	2.14
One sack cement—1 cu. ft. expanded perlite			
2	11.9	13.2	1.99
4	11.7	12.9	2.16
8	11.5	12.5	2.45

*From "Technical Data," Halliburton Oil Well Cementing Co.[14]

this purpose large percentages of diatomaceous earth have been successful. Cements containing as much as 60% diatomaceous earth by weight of the cement have been slurried to 10.2 lb. per gal. for successful cementing jobs in the field.

Diatomaceous earth is a naturally occurring silicon dioxide containing very little aluminum. For this reason cements containing diatomaceous earth are less susceptable to deterioration by sulfate-containing waters than cements containing bentonite or pozzolans. A comparison between the chemical analysis of the major materials used for low-density cement is given in Table 5.

DIACEL D, a trade name for diatomaceous earth, lowers cement density primarily because large amounts of water may be added to the slurry without separation of solid particles. This, of course, if assisted by the slight density advantage gained by replacing a part of the cement with the lighter-weight diatomaceous earth.

Because a cement slurry containing diatomaceous earth is composed of noncompressible materials, the density does not change with an increase in pressure. This means that slurry densities at the surface are comparable with those downhole.

Aside from permitting the lower densities under all conditions of pressure, diatomaceous earth renders cement slurries more resistant to contamination by corrosive water. This is because of the very low amount of aluminum in diatomaceous earth. If diatomaceous earth or any other additive is to be used in areas having corrosive waters, it is suggested that a sulfate-resistant type of cement be used.

Diatomaceous earth cements have excellent perforation characteristics.

The photographs compare perforation characteristics of 20 and 40% diatomaceous earth cements with those of neat cements cured at 140° F. The diatomaceous earth perforation tests were made on specimens 18 in. long, whereas the neat-cement tests were made on specimens only 14 in. long. Table 6 gives a comparison of the actual depths of penetrations in these three systems.

Aside from the greater penetration, the diatomaceous earth cements also allow for much less shattering. In fact, there is no evidence of any shattering around any of the diatomaceous earth cement perforations.

Gilsonite is plugger . . . Most recent type of diluent in low-density cement is gilsonite. Gilsonite cements are normally considered too expensive to be used merely as lightweight cements. For instance, an 11-lb. per gal. slurry of gilsonite cement is more than three times as expensive as an 11-lb. per gal. slurry of cement containing diatomaceous earth.

Gilsonite is more commonly used as a bridging material. Bridging materials will be discussed later.

Low density with gilsonite results from adding a diluent of density less than that of portland cement.

To get a smooth cement slurry, gilsonite must be run with bentonite, pozzolan, or diatomaceous earth.

Cement Strength

Density of portland cement can be lowered only by diluting it in one of several ways. Any manner in which the portland cement is diluted tends to decrease the strength of the cement as the density is decreased. The manner in which a particular density is reached, however, may dictate the strength of that particular formulation at that particular density.

Table 7 gives a 24-hour compressive strength of a number of different low-density cement formulations when cured at atmospheric pressure and 140° F. In each case the densities listed are those taken from the literature as the density measured at 3,000 psi. The formulations were chosen because it is possible to get a common density using these systems.

Direct comparison of the compressive strengths of these cements can be made at a density of 12.6 lb. per gal. Listed in order of decreasing compressive strengths, these systems are diatomaceous earth cement, gilsonite-gel cement, gilsonite-pozzolan cement, gel cement, expanded perlite-gel cement, expanded perlite-pozzolan cement. These values range from a high of 940 psi. for diatomaceous earth cement to 210 psi. for the expanded perlite-pozzolan cement.

What strength is needed? . . . These

TABLE 4—PROPERTIES OF IMPROVED PERLITE CEMENT*

Gel, per cent	Surface density, lb. per gal.	3,000 psi. Density, lb. per gal.	3,000 psi. Yield, cu. ft. per sack
One sack cement—½ cu. ft. improved perlite			
2	13.0	13.7	1.91
4	12.7	13.4	2.09
8	12.3	12.9	2.38
One sack cement—1 cu. ft. improved perlite			
2	12.1	13.2	2.46
4	12.0	12.9	2.64
8	11.7	12.6	2.93

*From "Technical Data for Use of Strata-Crete 6," Great Lakes Carbon Corp.[15]

TABLE 6—PENETRATION OF BULLETS IN DIACEL D AND NEAT CEMENTS

Cement—	Penetration, in. at— 1 day	2 days	3 days
Neat	..	..	7
20% DIACEL D	13	13	11
40% DIACEL D	18	18	18

Cements cured at 140° F.

TABLE 5—TYPICAL CHEMICAL ANALYSES OF LOW-DENSITY CEMENT ADDITIVES

	Chemical analysis, per cent — DIACEL D	Fly ash	Natural pozzolan	Perlite	Bentonite
Silicon dioxide	89.0	43.2	44.0	71.4	61.8
Aluminum oxide	4.8	43.0	30.5	13.4	22.0
Iron oxide	1.8	43.0	30.5	1.7	4.3
Calcium oxide	0.8	5.9	10.2	1.3	1.3
Magnesium oxide	0.8	1.0	6.4	1.0	2.5
Sodium oxide	0.6	..	2.6	2.9	2.0
Potassium oxide	Trace	..	2.6	4.1	2.0
Sulfur trioxide	...	1.7	Trace	...	1.0
Loss of ignition	3.0	3.0	...	4.2	4.8

TABLE 7—DENSITY AND COMPRESSIVE STRENGTH OF LOW-DENSITY CEMENT

Cement—	Density, lb. per gal.*	Compressive strength, psi.*
One cu. ft. improved perlite—one sack cement with gel, per cent:		
4	12.9	540
8	12.6	350
12	12.2	240
One cu. ft. improved perlite—one sack 50-50 fly ash with gel, per cent:		
4	12.6	210
8	12.4	150
Gel, per cent:		
10	12.95	1,050
12	12.6	620
Gilsonite in 4% gel, lb. per sack:		
25	12.6	880
100	11.0	390
Gilsonite in 50-50 fly ash, lb. per sack:		
25	12.5	620
75	11.2	220
DIACEL D, per cent:		
15	12.9	1,210
18	12.6	940
20	12.4	840
30	11.7	570
40	11.0	380

*Density as measured at 3,000 psi. Twenty-four-hour compressive strength when cured at 140° F.

lightweight cements in controlling lost circulation. In this field, well No. 1 was drilled to 9,231 ft. where 9,229 ft. of 5½-in. casing was set in a 9-in. hole. The casing contained a stage collar set at 7,641 ft. The first stage was cemented with ½ cu. ft. of expanded perlite to one sack of 4% gel slow-set cement. The same cement mixture was used to cement the second stage.

While cementing the second stage, the plug was pumped to 1,300 ft. when the casing pressured up to 3,000 psi. and the cement could no longer be moved. It was estimated at that time that 60 bbl. of cement had passed through the stage collar. Upon trying to reverse out, the formation took fluid at 100 psi. The failure of this stage cement job required eight remedial squeezes, totaling 475 sacks of cement and 19 days of rig time to correct.

In the second well, 9,834 ft. of 7-in. casing was run in a 9-in. hole. Sufficient expanded perlite-gel slow-set cement was mixed to bring the top of the cement back to 6,000 ft. plus 100%. This slurry was mixed in the ratio of 1 cu. ft. of expanded perlite to one sack of 4% gel cement. The top of the cement was found at 6,953 ft. It required three remedial squeeze jobs totaling 500 sacks of cement to place the proper amount of cement behind the casing.

For the third job, 9,734 ft. of 7-in. casing was set in a 9-in. hole. Sufficient 50-50 pozzolan cement with 4% gel was slurried to bring the top of the cement back to 6,000 ft. with 100% excess. A temperature survey showed top of the cement was actually 6,993 ft. This well required only one remedial squeeze of 500 sacks.

In well No. 4, 9,411 ft. of 7-in. casing were run in a 9-in. hole. A metal petal basket was set at 7,893 ft. and a stage collar was set at 7,885 ft. The first stage was cemented with 4% gel cement. The plug was bumped as the ports in the stage collar opened permitting circulation through the stage collar at 7,885 ft. The second stage was cemented with 4% gel.

Circulation was lost when pumping the second stage when 89 bbl. were left to be displaced. Even so, a temperature survey showed the top of the cement to be at 5,887 ft. Sufficient cement was used in this stage to have circulated cement to the surface. The top of the cement was considered sufficiently high that no remedial squeezes were deemed necessary.

Almost the same casing program was run in the fifth well when 9,422 ft. of 7-in. casing was set in a 9-in. hole. This well was cemented in three stages with stage collars set at 7,679 and 6,542 ft. with metal petal baskets set 7 ft. below each stage collar. The first two stages were cemented with 4% gel cement, while the third stage was cemented with regular neat cement.

A temperature survey showed no cement in the interval 6,542 to 6,740 ft. Three remedial squeeze jobs were necessary to place cement in this interval.

Wells No. 6 and 7 were cemented with 40% diatomaceous earth cement. In well No. 6, 9,148 ft. of 7-in. casing were set in a 9-in. hole; and in well No. 7, 9,302 ft. of 7-in. casing were set in a 9-in. hole. Both jobs were cemented in a single stage, with the top of the cement being at 5,770 ft. in well No. 6 and 5,395 ft. in well No. 7. No squeezing was necessary in either job.

Close perforating in Kansas . . . Wells in western Kansas have been drilled to around 4,200 ft., cemented with 12 lb. per gal. diatomaceous earth cement, perforated in intervals very close together, and acidized. An example of this is Phillips' 3 Llanos well in Sherman County, Kansas. Seven-inch casing was cemented at 4,950 ft. in an 8¾-in. hole with a 12.4-lb. per gal. slurry consisting of 95 sacks of common cement with 20% diatomaceous earth.

The Lansing-Kansas City formation was perforated in intervals 4,436-40 ft. and 4,450-68 ft. A straddle tool was run on 2½-in. tubing, and the upper zone was acidized with 1,500 gal. at 750-psi. maximum pressure after it had tested only 0.5 bbl. of oil by swabbing. After acidizing, it tested 12 bbl. of oil per hour with no water.

The interval from 4,450 to 4,468 ft. swabbed 9 bbl. of oil per hour and 1 bbl. of water per hour without acid. The two zones together produced 16 bbl. of oil per hour and 1 bbl. of water per hour on swab test through 2½-in. tubing. These perforations were 10 ft. apart.

Another example is Phillips 1 Orinda in Pawnee County, Kansas. Seven-inch casing was cemented in an 8¾-in. hole at 4,053 ft. with 40 sacks of common cement with 40% diatomaceous earth, using an 11-lb. per gal. slurry.

The Simpson formation was perforated from 3,983-97 ft. and 3,972-78 ft. The well produced 8 bbl. of oil per hour from the Simpson formation before treatment. The well was then fractured with 10,000 gal. and 10,000 lb. of sand at a maximum pressure of 3,800 psi. After fracture treatment, this zone produced 13 bbl. of oil per hour.

The Lansing-Kansas City formation was then perforated from 3,943-53 ft. and did not produce any fluid before acidizing. It was then acidized with 500 gal. at a maximum pressure of 900 psi. After acid treatment, it produced 10 bbl. of oil per hour and 5 bbl. of water per hour.

The Lansing-Kansas City perforations were 19 ft. from the Simpson perforations in this well.

Saturated-salt cement works . . . A wildcat was drilled in Roosevelt County, Montana, through a salt section. A string of 7-in. casing was run in a 9-in. hole to 7,950 ft. Since the top of the salt section was at 5,780 ft., it was decided to run enough cement to obtain fillup to approximately 5,500 ft. From the caliper survey, and assuming that 150% excess would be required in the 220-ft. section washed out to greater than 16 in. through the salt zone, it was calculated that 1,188 ft. of slurry would be required.

A saturated-salt cement slurry was prepared by dry blending 40% diatomaceous earth cement with 83% granular salt. A temperature survey run 14 hours after cementing, indicated the top of the cement at 4,820 ft. Average slurry weight was 12.3 lb. per gal.

The program for the well included perforating and testing 2 intervals—7,621-27 ft., and 7,640-50 ft.—and to perforate and block squeeze below the 7,650-ft. mark. The casing was perforated to block squeeze, but at 4,000 psi. only ½ bbl. of water per minute could be pumped into the formation. The casing was then perforated in the 7,640-50-ft. interval and after testing was squeezed off. Ten sacks of cement were squeezed into the perforations at 5,000 psi. These small volumes and high pressures indicate the good shutoff that was obtained with the diatomaceous earth cement system.

A study of the caliper log and the temperature-survey curve showed that, for every enlarged section of hole below the top of the cement column, there was a corresponding kick in the temperature. The mud weight was 10.1 lb. per gal., and, theoretically, the heavier cement slurry should have displaced the mud in the enlarged section. This appears to be true when the logs are compared.

Light weight in West Texas . . . A good example of what may be done with a low-density cement is exhibited in Phillips' 1 Harral "A", Pecos County, Texas.[1] A 12¼-in. hole had been drilled from under the surface casing at 1,560 ft. to 10,529 ft., where

a string of 9⅝-in. casing was set and at which time the drilling-mud density was 10.4 lb. per gal.

To place cement behind the entire casing string—some danger of lost circulation was known to exist—the 10.5-lb. per gal. cement slurry was used. This lightweight slurry, consisting of 60% diatomaceous earth in common portland cement, was followed with 300 sacks of neat slow-set cement slurried to 15.8 lb. per gal.

The cement was displaced with mud at a maximum pressure of 800 psi. Although circulation was lost during the last 30 bbl. of displacement, contaminated cement was circulated and hard cement was found 50 ft. from the surface.

This well was drilled to 15,863 ft. before another protective string of casing was set. After the 7⅝-in. protection casing was set, this well was drilled on to 19,020 ft. Although drilling and testing continued on this well for over a year after the 9⅝-in. casing was set with 10.5 lb. per gal. cement, absolutely no difficulty was experienced with this primary cement job.

Record well, record cement . . . In this same general area diatomaceous earth permitted the longest single column of cement ever placed in a single stage. This was in the 1 Phillips University "EE" when 18,819 ft. of 10.8-lb. per gal. cement, consisting of 40% diatomaceous earth and 1.5% DIACEL LWL in slow-set cement, was followed by 100 sacks of neat cement containing 1.5% LWL and slurried to 15.8 lb. per gal.[11]

Low-density cement was placed to a record depth of 25,340 ft. in this same well.[1] This cement slurry was 12.3 lb. per gal. and consisted of 20% diatomaceous earth and 3% DIACEL LWL in slow-set cement.

Phillips set another record in this area when it set 15,868 ft. of 9⅝-in. casing in the 1 Montgomery "A".[12] This casing was cemented from shoe to surface in two stages with 10.8 lb. per gal. cement. Both stages were tailed in with neat slow-set cement. The bottom stage consisted of 40% diatomaceous earth cement and 0.75 percent DIACEL LWL. The top stage was 40% diatomaceous earth in common portland cement.

This well was drilled to 23,000 ft. before another string of casing was set. The volume of cement blended for both stages of this job was quite large—13,235 cu. ft.

Low density better? . . . There are a number of areas in the United States where it is common to use a bridging material with low-density cement. Careful analysis of the jobs in these areas does not reveal that the bridging material was really necessary where circulation had been completed before cementing began. In all probability, a good low-density cement would have accomplished the same thing.

A study of these wells did reveal, though, that in a number of cases returns were lost while cementing with a bridging material in the slurry. No returns were lost in the same area when a low-density cement was used. This was true even when the density of the cement containing the bridging material was the same as that of the slurry containing no bridging material.

This seemed to be unique, however, inasmuch as in every case the bridging material was expanded perlite. This can be explained by an increase in the flow properties of the cement slurry containing the bridging material or by an increase in the slurry density downhole because of pressure crushing the small glasslike bubbles.

There have been cases of bridging materials actually plugging the casing. This appears most prevalent in wells which have been dry-drilled. Perhaps the problem could be reduced by running a few sacks of cement which did not contain bridging material ahead of the rest of the slurry.

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Folding catwalk expedites use of swab line

ON LATER-MODEL well-servicing rigs, all of the controls are up near the derrick floor except the controls for the bailing or swabbing line.

Carl Martin Oilwell Service Co. of Houston added this folding catwalk which keeps the truck within legal limits when over the road, yet is readily available for use when on location. For rod and tubing jobs, it remains folded up out of the way, but when it is necessary to use the swab line, the walkway is turned down on its hinges. A ladder folds out from the front of the walk to make it easily accessible to the operator. It is shown in use by Garland Herrod, roughneck on Gulf's Mrs. Hope Quiller 4 in the Pierce Junction field, Harris County, Texas.

THE 69½ FEET THAT REACH THE MOON

Time: One hundred years ago—1859.

Place: Titusville, Pennsylvania.

Event: The first U. S. oil well "came in" at 69½ feet. And from it and its successors have come endless miracles of oil.

Today, petroleum gives us fuels that are capable of moving man from earth to the moon and beyond. Such explorations can bring new knowledge of incalculable value.

But no less certain than the conquest of space is that we will have ever better fuels and lubricants for travel on the ground, on the sea, and in the air—new and exciting products for the farm, industry and the home.

Today it is estimated that one quarter of all the money spent by U. S. industry on research is spent by the petroleum industry.

And as chemists study the endless ways to rearrange oil molecules to make useful products, we can see that the age of petroleum has only begun.

Standard Oil Company (New Jersey) Esso

J&L EXTREME LINE CASING permits running rates up to 50% faster. High quality of every length is due to J&L controlled-quality steel, accurate heat treatment, joint design, precision methods of manufacture, inspection and testing. Manufactured under license from the National Supply Co.

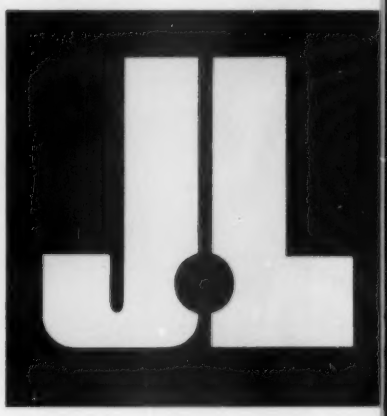
Drilling operations have proved the value of J&L Extreme Line casing at this North Dakota well.

This high strength Extreme Line casing is 5½ inch O.D., 17 lb. per ft., Grade N-80.

Integral joint of this J&L Extreme Line casing gives smoother running.

Precision tooling and careful inspection of Extreme Line casing joints hold tolerances within closely specified limits.

This hydrostatic tester is typical of thorough testing equipment used to inspect every length of J&L Extreme Line casing.



High-Pressure, Deep Well Drilling Demands J&L Extreme Line Casing

. . . states a large drilling operator in North Dakota

Drilling operators know that high pressures encountered in drilling deep wells call for special quality casing—casing designed for high strength, leak resistance, and fast running. Extreme Line casing, made by Jones & Laughlin, meets these demands.

MAXIMUM JOINT STRENGTH. A modified Acme-type thread assures a strong interlock because it overcomes the tendency of the mating threads to slide out of engagement.

RESISTANCE TO LEAKAGE. The seal consists of a curved surface extending beyond the male threads, and a tapered conical seat beyond the inside end of the female threads. The seal holds even though the pipe body may expand from internal pressure.

HIGH RUNNING SPEED. Running rates into the well are as much as 50% faster than for conventional API T&C casing in the same size and range length. Deeper stabbing reduces the number of turns required for make-up. Less than one turn is necessary from hand-tight to shoulder contact.

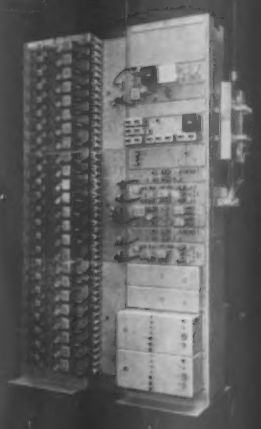
Integral joints with upset ends in Extreme Line casing eliminate couplings and reduce the number of threaded connections to one-half that of T&C casing. Specially designed threads minimize hoop stresses by taking tensional loads in shear. The joint has reduced O.D. and is streamlined, internally and externally.

J&L Extreme Line casing is readily available in J-55, N-80 and P-110 grades. Specify J&L Extreme Line for your severe drilling operations. Write for technical data, Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pa.

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

GENERAL ELECTRIC NOW OFFERS THE ONLY COMPLETE MICROWAVE LINE



2 kmc
6 kmc
time division
frequency division
now available

By adding 6 KMC equipment to its 2 KMC line, General Electric now offers the first and only complete line of microwave in the industry.

Proved Reliability

General Electric microwave equipment has earned an outstanding reputation for dependability. Southern Colorado Power Company, for example, enjoyed a reliability factor of 99.99 percent in 18,360 hours of operation using General Electric 2 KMC equipment. This same reliability is engineered and built into the new 6 KMC product.

More Flexibility for Systems Designers

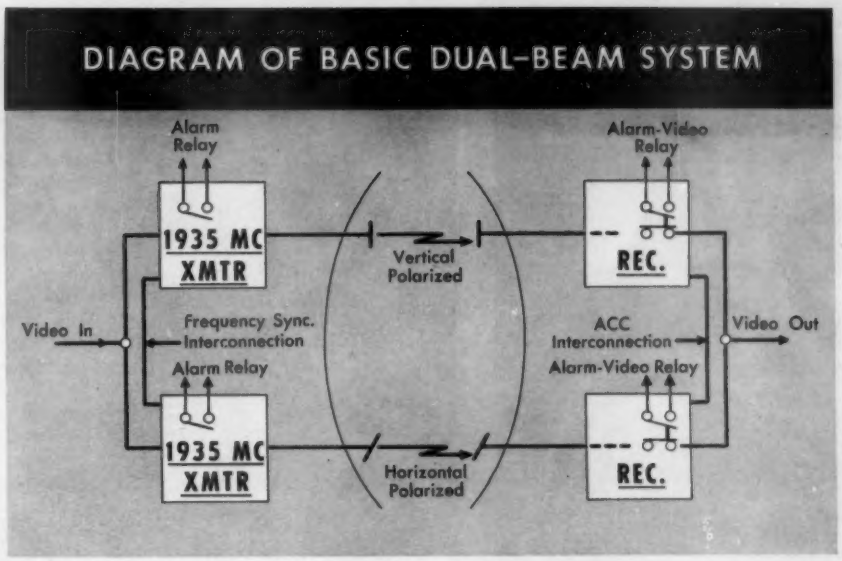
Microwave systems designers now have a wider choice than ever before *from one unbiased source.* They not only can choose between 2 and 6 KMC equipment, but also between time and frequency division multiplexing. Thus systems planners can pick the exact product or combination of products to suit their needs, providing from one to 120 voice channels for communication or control.

For complete information on General Electric microwave, contact your G-E communications consultant, listed under "Radio Communication Equipment" in the Yellow Pages. Or write General Electric Company, Communication Products Dept., 1889-3, Mountain View Road, Lynchburg, Va.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Communication Products Dept.



SINCLAIR'S NEW MICROWAVE SYSTEM starts at the company's Marion, Ohio, headquarters (picture at left) and extends through seven pump stations to the East Pittsburgh terminal.

99.932% reliability with

Dual-beam microwave system

By G. V. MORCK
Assistant Superintendent
Communication Department
Sinclair Pipe Line Co.

WITH the growth of automation in the petroleum industry, especially in the pipeline companies where remote-controlled pumping stations are now quite commonplace, outage time for private-communication systems has taken on a new significance.

We can no longer afford to be satisfied with a microwave system which consistently performs at 95, 98, 99, or even 99.5% of the time. We must constantly strive for the ultimate goal of 100% reliability, even though it may be economically unobtainable, by taking advantage of the latest technological advances.

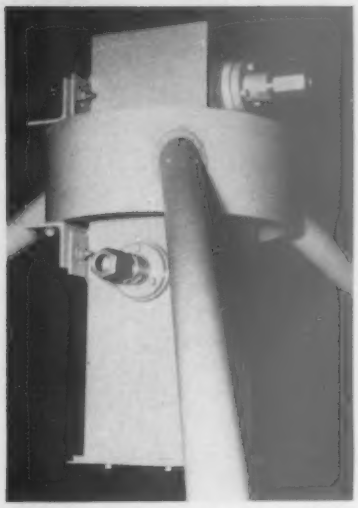
One of these advances which was designed and developed by the Federal Tele-communication Laboratories, a division of IT&T, and is commonly known as "dual-beam microwave operation" has been used by Sinclair Pipe Line Co. since September 1956. Since that date we have obtained an average reliability factor of 99.932%. Converted to actual time this amounts to an average of 6 hours and 5 minutes outage per year. This excellent reliability factor for a petroleum-industry microwave system can only be attributed to the use of dual-beam equipment.

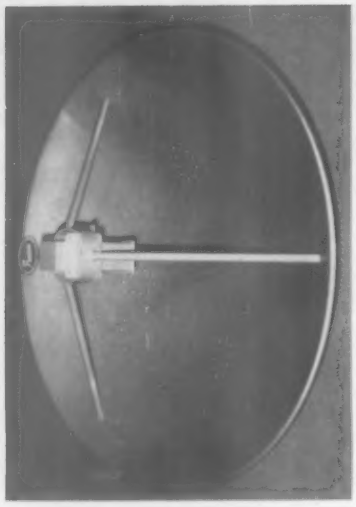
A dual-beam microwave system is actually two separate and independent microwave systems operating on a single microwave frequency. This mode of operation is comparatively simple to understand and maintain.

The basic principle of this system is the ability to separate the vertical and horizontal polarized radio waves of a single microwave frequency. This separation should be of the order of 20 db. or more for optimum operations.

On the Sinclair dual-beam microwave system, which extends from Pittsburgh to Marion, Ohio, there are actually two prime RF paths in each

Presented at Petroleum Industry Electrical Association meeting, Galveston, Tex.





DUAL POLARIZATION FEED HORN at left is used with single parabolic reflector at right for simultaneous transmission of two polarized radio waves.

direction. These two paths may be classified as:

1. The vertical polarized RF path.
2. The horizontal polarized RF path.

Each RF path is completely independent of the other, electrically speaking. There are separate RF transmitters, RF receivers, RF power supplies, duplexers, and coaxial transmission lines. However, a single parabolic reflector incorporating a dual polarization horn feed is used for the simultaneous transmission of both polarized radio waves. This type of antenna, as used on our system, was developed by Prodelin, Inc., and exhibits a negligible crosscoupling effect between the two polarized waves.

Greater crosscoupling occurs from parasitic reradiation from supporting tower structures, asymmetries in antenna structure, and in the peculiarities of propagation, such as scattering and twist. If this crosscoupling became severe there could conceivably be a reduction in the received signal strength due to wave cancellation between the orthagonally polarized waves. However, actual field and operating experience has indicated that this has never been a problem with our system.

How Dual-Beam Functions

The basic microwave equipment which is used in this system is Kellogg's Type 10-C PTM microwave equipment operating in the 2,000 mc. band. The video output signal from the multiplex equipment at the terminal station is applied simultaneously, by means of a parrallel feed hookup, to two transmitters. Each microwave transmitter is crystal controlled, with the fundamental oscillator operating at a base frequency of 51.5 mc. to 55.3 mc. for the 1,700 to 2,000-mc. band.

Since in a dual-beam operation of this type the RF outputs of both transmitters must be at exactly the same frequency, a method of synchronizing both transmitter's oscillators must be provided. This is accomplished by a combination of an a.c. and d. c. coupling between the cathodes, in the cathode follower sections of the fundamental oscillators in the transmitters.

The RF outputs of both transmitters are fed through separate duplexers and via separate coaxial transmission lines to the two polarization inputs of the center-fed horn-driven parabolic reflector. The radiated energy of the parabolic reflector now contains a vertical and horizontal polarized wave with each wave operating on the same frequency.

At the receiving station the polarized waves are kept separated by means of the special antenna and individual coaxial lines until the RF signals appear into the RF receiver. The video output of the two RF receivers are electrically tied together and feed a common load such as the receiving multiplex equipment or, in the case of a true backbone repeater station, the input section of the two RF transmitters. From this point the process is repeated once again.

Full duplex operation is used on each polarization, as in a conventional microwave system, with a frequency separation of 70 mc. between the transmitting and receiving frequencies.

Each microwave repeater station thereby contains the following RF equipment: (1) Two transmitters for the east-west direction (one for the horizontal polarized wave and one for the vertical polarized wave); and (2) two receivers for the east-west direction (one for the horizontal polarized wave and one for the vertical polarized wave).

Since the west-east direction contains the same number and type of RF equipment, the total number of transmitters and receivers will equal four of each. Of course at a terminal station the number of units will be one-half of the above amount.

Monitory and alarm features are provided in each individual transmitter and receiver which will automatically disable the unit from the system in case of trouble and transmit the proper alarm code to the terminal station. This prevents a faulty unit from introducing noise into the system.

An added feature is that the AGC buses of each pair of receivers are interconnected. This assures parallel operation of the two RF receivers over a range of moderate differences in received signal strength, while forcing "cutout," or disabling, of the r e c e i v e r with the poorer signal strength under conditions of large disparities of signal.

A bonus feature connected with a dual-beam microwave system is that up to 3-db. increase in signal/noise will be realized with this type of system as compared to a conventional single-path arrangement. This is because the intelligence-signal portions of the two radio waves will add algebraically by being synchronous, while the noise components from the receivers will add on a power basis. Therefore, with this parallel operation, the total combined signal output will be 6 db. greater while the combined noise components will only be 3 db. greater.

Dual-Beam Advantages

Why, from an operational and maintenance viewpoint, does the dual-beam system have a superior rating over a conventional microwave system utilizing 50% or 100% standby equipment?

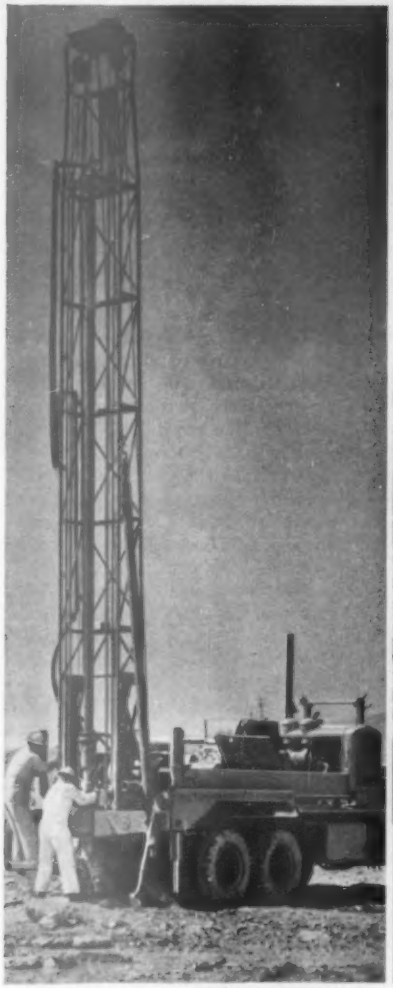
The dual-beam system has no standby equipment if one considers the word "standby" in the strictest sense. All the equipment on the system, if operating normally, is performing a work load and is contributing equally to the successful operation of the system. Thus there is no need for complex switchover units with their associated sensing equipment, no interruption of traffic should a transmitter or receiver fail. All units are constantly monitored for abnormal operating conditions. And perhaps the greatest advantage of all is that the

NOW YOU CAN STANDARDIZE WITH THE

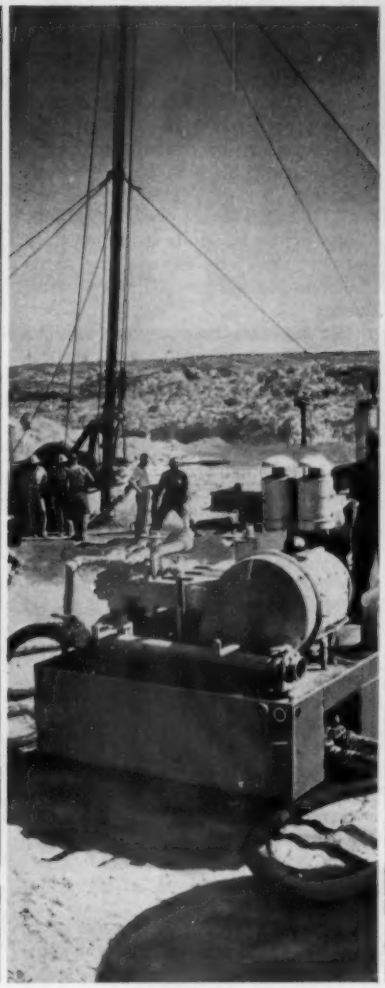
all purpose power line

(20 TO 1650 H.P. IN ONLY 3 CYLINDER SIZES)

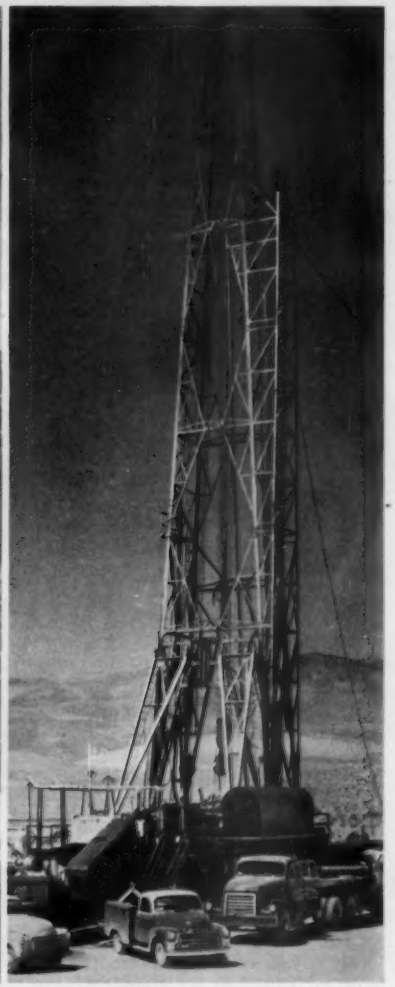
. . . and get all the benefits of GM Diesel standardization in any type of equipment built by over 250 leading manufacturers



Standardization with GM Diesel engines pays off big for oil men because fast-stepping, 2-cycle "Jimmy" Diesels power the finest equipment—get work done faster.



GM Diesel covers the power spectrum—20 to 1650 H.P. with only 3 cylinder sizes—compared to the 5 to 10 cylinder sizes which other Diesel manufacturers use.



Operators who standardize on GM Diesel power need stock, at most, only 3 sizes of wearing parts—maintain full protection with the smallest investment in spares.

GM DIESEL

PARTS AND SERVICE WORLDWIDE

DETROIT DIESEL ENGINE DIVISION, GENERAL MOTORS, DETROIT 28, MICH

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

microwave maintainer can readily observe, check, and analyze a defective unit under actual operating conditions and initiate repairs without interrupting traffic.

Let us examine these advantages in greater detail.

Standby Problems

The switchover panel is a necessary evil associated with standby equipment. There are many versions of the unit, with each microwave manufacturer designing a unit unique to his equipment. However, the complexity of the switchover and sensing equipment is, at times, of the same magnitude as the equipment being switched.

However, there is always the possibility that the switchover unit will not function properly by either failing to switch the standby equipment into service when called for, or, what has been a common occurrence for for us, switching the standby unit into service when not called for. At any rate, malfunctioning of the switchover unit is a cause for increased outage time. This problem is nonexistent with the dual-beam system.

When operating with cold-standby equipment there is always the time lag involved when switching over to standby before traffic can be resumed. This can be of major annoyance especially on a relatively long system heavily loaded with telemetering information. Even with so-called hot-standby, information can be lost while switchover occurs. This problem is nonexistent with the dual-beam system.

During the time conventional standby RF equipment is idle there is always the possibility that the standby equipment will fail when placed into service. Regardless of what type of preventive-maintenance program is in force to protect against failures of this nature, there is still the unknown quantity prevalent when the standby unit is switched into service. Will it, or will it not, work?

In a microwave station operating with conventional cold-standby equipment there is the chance that a particular tube or circuitry conditions existing within the standby unit is of a borderline condition prior to switchover. The electrical shock associated with the switchover will, in the majority of cases, drive the borderline condition into a complete failure.

With hot-standby equipment, tubes and component failures within the standby equipment can, and usually do, occur between the visits of the microwave maintainer. When this happens standby protection is lost at the station until noticed and corrected by the maintainer during his next visit to that particular station.

The sole function of any standby equipment is to prevent outage occurring whenever the main unit, which the standby is protecting, fails. Should this ability be anything less than 100% reliable and tend to actually increase outage time because of this factor, then the installation and justification of conventional standby leave much to be desired.

This author has witnessed numerous instances when false switching to standby occurred. The standby unit was defective and the system was out until a microwave maintainer could arrive at the site. What makes this type of occurrence so frustrating is that the main unit was functioning properly until it was removed from operation by the false switchover. With the dual-beam system, failure of any of the RF units is immediately alarmed; therefore, the working status of the entire system is known at all times.

The problem encountered with all microwave maintainers with respect to performing routine maintenance, or corrective trouble clearance, on standby equipment, is that the standby unit has to be placed in service for the final evaluation of the performance of the unit. With either the hot or cold standby equipment this final check of the equipment is an absolute necessity.

If the maintainer is not positive the standby unit will operate satisfactorily, and may interrupt traffic when placed into service, he is usually required to wait until all the channels are clear of traffic. This takes time. If the standby is not functioning properly the maintainer attempts to locate the problem as quickly as possible. However, outage time is being incurred and the maintainer is working under considerable pressure. This is not conductive to good maintenance, nor to the good health of the maintainer.

This problem is also prevalent when performing maintenance or trouble clearance on a main RF unit when the station is on standby. The equipment has to be placed in actual operating service before the status of the defective unit is fully known.

With the dual-beam system, since each RF path is independent of the other, the maintainer can perform his routine maintenance work, or trouble clearance under actual operating conditions without disturbing traffic. This is a tremendous advantage that the maintainer of a dual-beam system has over his fellow technician working on a system utilizing standby equipment.

Comparison of Different Systems

An interesting comparison can be drawn between the performance capabilities of our dual-beam system and a system having approximately the same number of stations, utilizing the same type and make of equipment, but using 50% cold RF standby. Both systems are maintained by Sinclair Pipe Line and the qualities of the microwave maintainers are equal. The comparison figures are for a 2-year period.

The dual-beam system averaged out for a reliability factor of 99.932% or, as mentioned previously, a total outage time of 6 hours and 5 minutes per year.

The system employing 50% cold standby averaged out for a reliability factor of 99.197%, or for a total outage time of 70 hours and 15 minutes per year. Comparing the two figures shows that the outage time encountered with our dual-beam system is less than one-eleventh of the outage time obtained with our 50% standby system. Undoubtedly, there are many microwave users in the petroleum industry who would enjoy reducing their outage time by 90%.

Cost of a dual-beam system compares favorably with a system employing conventional standby equipment.

Two additional transmission lines to the top of the microwave tower, and the special center-fed polarized horn driven parabolic reflector are required for dual beam. The switchover and sensing equipment of the standby unit and the conventional dipole parabolic reflector are needed for a system with 100% standby.

Compared to a system employing 50% standby equipment the cost comparison is similar to the above with the exception, of course, that an additional RF unit consisting of one transmitter and one receiver is required for the dual beam system.

At repeater site installations the cost difference between dual beam operation and 50% standby operation probably will not exceed 10%.

At repeater site installations and all terminal installations the cost difference between dual-beam operation and 100% conventional standby operation will be much less than 10%.

The installation of a dual-beam microwave system cannot by itself guarantee a 99.9% plus reliability factor if the basic design of the RF and associated equipment, or the routine maintenance program, is not sound. However, with everything being equal, it has demonstrated conclusively its superiority to systems employing conventional standby equipment and should bring its users much closer to 100% reliability.

engine power
BY CATERPILLAR

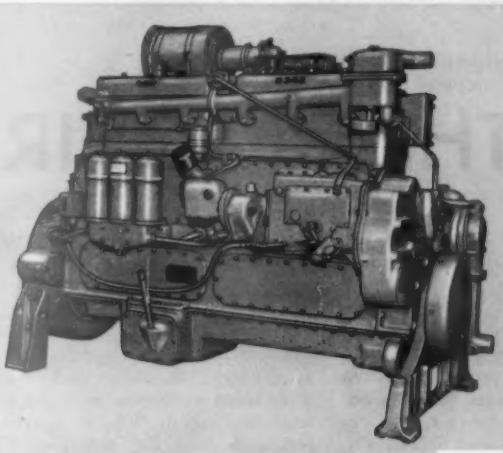
The new D342 Spark-Ignition Engine... lowest cost-per-horsepower gas engine

The new Caterpillar D342 Spark-Ignition Engine has the lowest cost per horsepower of any gas-operated engine you can choose.

You can select either the 7.5:1 compression ratio—for butane, propane or field gases—or the maximum efficiency 10:1 compression ratio engine for methane-type gas operation. And you can switch to diesel operation simply by changing pistons and fuel systems.

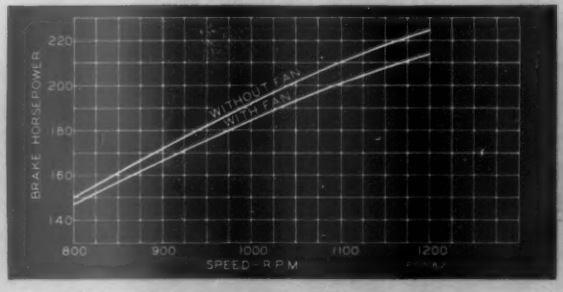
This is another dependable power-where-you-need-it Caterpillar Engine for oilfield use. Specify Cat power or see your Caterpillar Dealer who will demonstrate the ways Caterpillar will do more things and do them better for you.

Engine Division, Caterpillar Tractor Co., Peoria, Illinois, U. S. A. Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

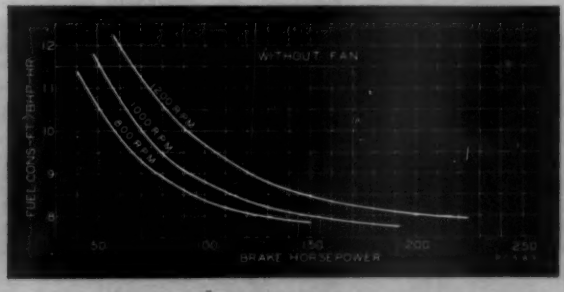


With the 7.5:1 compression ratio, the D342 Spark-Ignition Engine produces 200 BHP at 1200 RPM, without fan. At the same RPM without fan, the 10:1 compression ratio produces 225 BHP.

The D342 Spark-Ignition Engine has this safe, positive ignition system



Highest horsepower per dollar you can buy 10:1 compression ratio



Curves illustrate low fuel consumption 10:1 compression ratio

"At about 1545 CST on 15 October, 1958, a fire occurred on the offshore Platform 45-E of the West Delta Block, Gulf of Mexico, with a resultant loss of life of one known dead and six missing, presumed dead.

"Property damage, exclusive of loss to petroleum products and costs of extinguishing the fire, is estimated at 6 million dollars."

The cheerless words above begin an official United States Coast Guard report on a now-famous oil disaster. In the interest of preventing recurrences of such accidents, The Oil and Gas Journal here publishes an account based on the Coast Guard report on what caused the disaster, what followed it, and what the consequences to offshore operators likely will be.

THE CATC FIRE

How it happened and what followed

FOUR OPERATIONS of special significance were taking place on Platform 45-E on October 15, 1958.

At well No. E-1, two men were replacing christmas-tree equipment damaged by the well's sanding condition. At well No. E-7, testing was under way on what might have become the world's second four-string quadruple completion. At location E-8, conductor casing was being welded prior to spudding a new well as soon as E-7 was completed. And, about 10 ft. away from E-1, workers were installing a new water line.

Two of these operations (the well testing and the tree repair) could have furnished fuel for a fire; the other two (welding the water line and welding conductor casing) could have furnished the spark. Though the exact spot is in doubt, the Coast Guard committee which later investigated the matter is of the opinion that the fuel and spark from these sources met and exploded into one of the oil industry's costliest fires.

Manned, key platform . . . Platform 45-E was operated by Continental Oil Co. for the group of producers known as CATC which includes, besides Continental, Atlantic Refining Co., Tidewater Oil Co., and Cities Service Co. Nicklos Drilling Co.'s Rig 19 was on the platform and in operation.

Location was 8.8 miles into the Gulf of Mexico from Pelican Island, La., in Block 30 West Delta field. Platform 45-E itself was a "key" structure from which 19 wells were operated and which served as a transfer point for 4 other platforms.

The platform was steel and carried a wooden main deck about 50 ft. above the water. The main deck was 130 ft. long and 106 ft. wide. A steel crew-quarters building raised 5 ft. above the main deck sat at the end opposite the drilling rig. Of the 29 persons on the structure on October 15, 1958, those not actually at work on the rig or on the wells were in the quarters building working or sleeping in their rooms.

Seven wells active . . . About 10 ft. below Platform 45-E's main deck was an 80 by 22-ft. cellar deck. On this were seven wellheads, arranged in two lines and about 7½ ft. apart. The wellheads were for: well E-1, a dual completion; E-2, a triple; E-3, another triple; E-4, a dual; E-5, a triple; E-6, a dual; and E-7, being completed as a quadruple.

On wells such as those on 45-E, Louisiana regulations usually call for storm chokes in the tubing. However, the Commission on Conservation has granted exceptions to this rule in other fields because of excessive sand production in the wells. Continental had petitioned the commission for an exemption in December 1957 for these wells; but, according to the Coast Guard, this exemption had not yet been granted.

At about 3:30 a.m., Leo Evans, Continental pumpman, discovered that well No. E-1 was flowing unrestrained because sand had cut out one of the chokes. In order to install a new

ANOTHER SUCCESSFUL JOB—WITH...

HALLIBURTON SAND-ACID

Zapata Petroleum Corporation says, "Sand-Acid gives far superior results compared to those obtained with other fracturing fluids."

In well after well, where this specific fracturing treatment has been applied, the same successful results are reported. Here are two examples:

ZAPATA WELL #1 – Maljamar Field – Lea County, New Mexico

This well was first treated with 10,000 gallons of lease oil and 10,000 pounds of 20/40 sand. Production rapidly settled at 15 BOPD.

The well was then treated with 15,000 gallons of 7.5% acid, containing 7,500 pounds of 20/40 sand... and ALC-5, a Halliburton low fluid loss additive. Treatment was divided into three stages, with two batches of 30 Perfpac balls each. The injection rate during treatment was 23 bbls./min.

RESULTS

Test production initially was 110 BOPD... 3 months – 48 BOPD plus 5% water... 12 months – 14 BOPD plus 1.6% water.

ZAPATA WELL #B12 – Maljamar Field – Lea County, New Mexico

This well, completed one zone in San Andres and three zones in Greyburg formations, was treated with a total of 34,000 gallons of Sand-Acid with ALC-5 and 17,000 pounds of 20/40 sand. The one zone of San Andres was treated with 15,000 gallons of 15% acid, the three Greyburg zones with 19,000 gallons of 7.5% acid. Average injection rate was 17 bbls./min.

RESULTS

Test production after 2 weeks was 221 BOPD... 3 months – 219 BOPD plus 1.4 bbls. of water... 6 months – 109 BOPD plus 0.7 bbls. of water.

These formations in this area generally yield only a trace of oil before treatment. Major components are quartz, anhydrite and dolomite; minor constituents are feldspars, kaolinite, illites and salt in some sections. Properties include: solubility in hydrochloric acid – 10 to 40%; salt content – 200 to 1310 mg/100 gm core; permeability – from less than 0.1 to 4.5 md; porosity – 1.5 to 16.4%.

The combination of sand, acid, and Halliburton ALC-5 can give better results in many formations than acidizing or fracturing alone.

Prove to yourself the effectiveness of the Halliburton Sand-Acid Treatment. Investigate and program this superior stimulation treatment to applicable wells.

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Derrick power is supplied by 215 max. hp International UV-549 V-8 engine operating on LP Gas.

The Edwards' Well Servicing Co., Velma, Okla., gets double duty out of this International-powered 66-ft. doubles derrick. Here it is shown completing a new oil well for Magnolia Petroleum Co. near Velma. But the lightweight portable rig is equally productive on well servicing assignments. It can be set up or made ready for transport in 30 minutes and travels highways without a permit, being only eight feet wide and 35-ft. long.

Power for the rig is supplied by a compact, high-output 215 max. hp International UV-549 V-8 power unit burning LP Gas. The complete doubles derrick is mounted on a special chassis of an International Sightliner truck.

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This double drum 66-ft. high Cooper rig drills or pulls and racks 13,000-ft. of 2⅞-in. pipe in doubles. It is said to be as fast or faster than conventional 90-ft. derricks.

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"Hot flux was falling through main deck down to cellar deck"

choke, all the wells on the platform were shut in for about an hour and a half, after which they were once more opened up.

Sanding continued in E-1 during the morning, making it necessary to clean out the choke. However, this time, wells E-3, E-4, E-5, and E-7 were allowed to continue flowing.

Open up flow line . . . By about 2:00 p.m., E-1 had sanded so badly that Evans decided it would be necessary to change out one of the tubing-wing valves. After closing in the well, he instructed Roustabout J. C. Purl to make the change. Purl and another roustabout, Gerald Crayon, then commenced the job.

The two removed the section of line including the choke and automatic shutoff.

Prior to this, the flow line had been shut off at the manifold valve. When they unbolted the wing valve, both said later, there was no sign of escaping gas nor oil. Nor, they said, was there any pressure.

As the two men laid the valve on the deck, at about 3:45 p.m., Crayon felt a blast of flame or heat strike him in the face. Purl heard an explosion.

Quadruple on test . . . Meanwhile, Robert Henderson, Continental production engineer, was supervising a test on well No. E-7. One of its four zones was flowing into a test separator on the main deck; the other three, already tested, were flowing into the regular production manifold.

Because the E-7 production was new, Arthur Johnson, a Nicklos roughneck, was at the wellhead, taking samples of the well fluid through half-inch valves. This, of course, required bleeding the wells to atmosphere and this was in progress at 3:45 p.m.

Johnson is among those missing from the platform.

Casing for new well . . . At the E-8 location, the drilling crew, under supervision of Driller Charles Moseley, was preparing 30-in. casing for the new well. Between 1:00 and 2:00 p.m., the crew had placed a joint of the 30-in. on the cellar deck where some welding was done on it by B. N. Puryear. At about 2:15, this job was completed and the crew went back to the main deck to place another joint of casing.

At 3:45 p.m., Puryear was again welding on the pipe. Hot flux was falling through the main deck down to the cellar deck. The lateral distance from the E-8 location and the welding to E-7 and the testing was 15 ft.

Puryear is also among the missing.

Installing water line . . . On the northwest corner of the cellar deck, about 10 ft. from E-1, two men were installing a 2-in. water line which was to run between the cellar and the main decks. One of the men, D. J. Hogan, had done some welding, but at some time between 1:00 and 2:00 p.m., Evans instructed him not to do any further welding until later in the day.

The second man of the team, F. G. DeSalvo, says Hogan did not resume welding. Another witness says he did. If Hogan did resume welding, it may have cost him his life, for he is also among the missing.

Of the men working on the cellar deck, DeSalvo was the first to see fire at the E-7 christmas tree.

A big "whoosh" . . . At about 3:45 p.m., those on the structure who were outdoors saw fire and smoke. Some heard a noise they described as an explosion; others said it was a big "whoosh." Everyone who was on the main deck located the noise and the original fire as coming from below. Most added that the source appeared to be the cellar deck.

Fire and smoke spread almost instantaneously over the whole structure. No effort was made to contain the fire. Everyone realized because of the rapid spread of the intense heat and billowing smoke that it was necessary to abandon the structure.

Edward Hillburn, Continental's senior drilling foreman, immediately called the shore office by radio. Henderson and Tool Pusher E. C. Swenson sounded the general alarm which was heard by many of the men.

Over the side . . . The men in the buildings chiefly took life jackets from their rooms. Some of these got out onto the main deck and either jumped or slid down the small line securing a ring buoy. Others, with life jackets, jumped out the window of the tool pusher's office which overhung the main deck. The survivors who had been working outside on the main deck jumped overboard from whatever spot was nearest.

Evans and another pumpman, W. N. Mooty, ran to the cellar deck to investigate but could see nothing because flame and smoke were everywhere. Then, they too abandoned the structure.

Of the men on the cellar deck, Johnson was not seen after the fire started. Crayon, badly burned and with his jacket afire, went down to the landing platform and jumped into the water to put out his fire. Purl went up to the main deck, found a ring buoy, and jumped into the water unhurt except for fire burns.

DeSalvo and Hogan also went up to the main deck. Hogan fell, recovered, and disappeared from DeSalvo's sight in the smoke, not to be seen again. DeSalvo went overboard from the main deck.

Picked up by boat . . . When the fire broke out, the production boat assigned to the structure was about one-quarter to one-half mile away, returning from another platform. In an action later officially commended by the Coast Guard, Don R. Parsley, operator of the boat, maneuvered into and around the platform dropping life jackets. For about a half hour, he circled, picking up all those found.

Eventually, Parsley moved his boat, the M/B Sportsman, away from the platform in the direction in which debris was floating in order to locate other persons, but none was found.

In addition to the survivors, the Sportsman also picked up T. F. Butler, who was in a state of shock but was believed to be alive when brought aboard. He died shortly afterwards.

Wallace Simmons, one of the missing, succeeded in getting off the structure but had trouble in the water. Raymond Hatler, a roughneck who was in the water near him, passed Simmons a life jacket. Hatler then ducked underwater to remove his boots. When Hatler resurfaced, Simmons had disappeared.

Other than Simmons and Hogan, none of the missing was noticed by any survivors after the fire started.

The Sportsman took the survivors to a nearby platform from whence they were removed to a New Orleans hospital. All were hospitalized for observation or treatment of burns and injuries. Many were injured by jumping into the water from a height of 50 or more feet.

Oil-company and Coast Guard helicopters helped transport the survivors and search for others. The cooperation of the other companies was according to a previously arranged disaster plan.

Month and half to kill . . . The fire quickly consumed all combustible material such as the oil stored on the

platform. As the wells were flowing at the time, they were soon ablaze at the wellheads. Not until the closing days of November, almost a month and a half later, was the last of these brought under control. In the meantime, three directional relief holes had been drilled and a new platform constructed alongside the old.

With the wells once more under control, Platform 45-E was reconstructed and work begun to restore the seven lost wells to production. At the time of this writing, several of the wells still are not capable of producing.

Fixing the Blame

After its investigation, the Coast Guard group was of the opinion that the welding above the E-8 position ignited gas from one of the wells, the manifolds, or high-pressure lines. As a result, the group recommended that no welding, burning, or other hot work be allowed on any offshore structure unless all wells on the structure are closed in.

This recommendation is subject to review by the Coast Guard commandant and has not been placed into effect as yet.

Long before the 45-E tragedy, Continental had published instructions to its supervisory personnel regulating the practice of welding on its platforms. However, the Coast Guard board claimed in its findings that no true responsibility existed for enforcing safety practices. This, they said, was the case in spite of the fact that the drilling supervisor on the platform was regarded by the company as "person in charge."

Drilling and production, said the Coast Guard, were regarded as independent operations with no recognized over-all authority to coordinate activities in the interest of safety. It is true that the company's pumpman instructed one welder not to work near the E-1. However, no one was consulted by Driller Moseley to determine whether welding should be allowed on the E-8 casing and no one instructed him that welding would be dangerous.

Out of these facts came the Coast Guard recommendation that all operators be required to designate in writing the identity of some one person as the "person in charge" for final responsibility in enforcing safety regulations.

Fire equipment useless . . . Because of the nature of the ignition and the rapid spread of the fire, the Coast Guard concluded, it was not possible to use the platform's fire-fighting equipment. This equipment had been inspected about 1 year before and found to be in accordance with regulations. Life-saving equipment was also found acceptable.

Many of the witnesses told the Coast Guard that they had never participated in emergency drills although they had worked regularly on the platform up to 2 years. Most witnesses could not recall a specific drill; none of the transient workers had participated in a drill on this platform. There was no system to assure that transients knew the location and use of fire-fighting and life-saving equipment.

The Coast Guard investigating group concluded that adequate instruction in casualty control would have minimized confusion and that better knowledge of the location and use of life-saving equipment might have saved the lives of some who were on the main deck.

With this in mind, the board recommended that emergency drills be required monthly for each regular crew working on the structure. Prior, only one drill was required per structure per month. The board further recommended that legislation be considered to authorize administrative penalties for failure to comply with safety regulations.

Nelson Refinery Cost Indexes

Published in the first issue each month in the Engineering Section.

Compiled by W. L. Nelson, Technical Editor and petroleum refinery consultant, Tulsa.

Charts of the indexes are published each year in a late January or early February issue.

Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the month of January, April, July, and October.

Refinery Construction Cost Index (1946 Basis):

Explained on page 101 of the issue of August 5, 1957.

	1950	1954	1956	1957	1958	April 1959
Pumps, compressors, etc.	138.2	166.5	192.0	206.7	214.7	226.4
Electrical machinery	134.9	160.0	175.0	188.9	192.7	193.8
Internal-combustion engines	126.0	150.5	164.0	173.9	178.3	178.4
Instruments	127.8	154.6	182.1	187.4	194.9	204.1
Heat exchangers	140.0	171.7	190.7	203.6	181.2	176.4
Misc. equipment average	126.2*	160.7	180.5	192.1	192.4	195.8
Materials component	149.5	174.6	190.4	201.9	204.2	206.7
Labor component	144.0	183.3	198.2	208.6	220.4	226.6
Nelson construction index	146.2	179.8	195.3	205.9	213.9	218.7

Refinery Operating Cost Indexes (1956 Basis):

Explained on page 171 of the issue of June 1, 1959.

	1946	1952	1954	1957	1958	March 1959
Fuel cost	49.6	81.0	86.5	112.4	102.6	105.8
Labor cost	73.1	88.7	90.9	106.1	105.0	102.0
Wages	52.4	81.5	88.7	104.1	105.4	111.8
Productivity	68.3	90.2	97.1	98.1	100.3	109.6
Investment, maintenance, etc.	51.2	83.6	92.0	105.4	109.5	112.1
Chemicals cost	37.0	72.1	85.7	102.2	104.4	101.3
Operating Cost Indexes:						
Refinery	58.5	80.5	88.7	106.4	105.9	105.3
Process units	62.9	82.2	88.4	107.1	105.8	105.6

*Used in computing the Nelson Index until April 1952.

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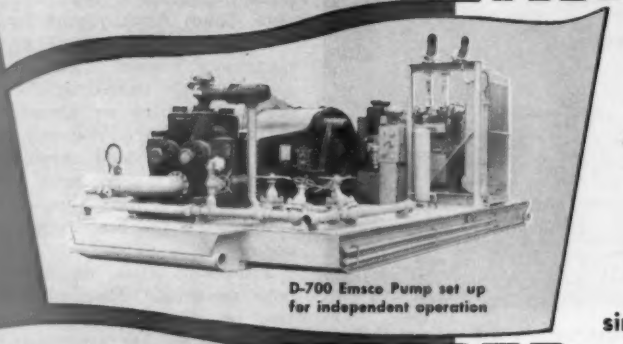

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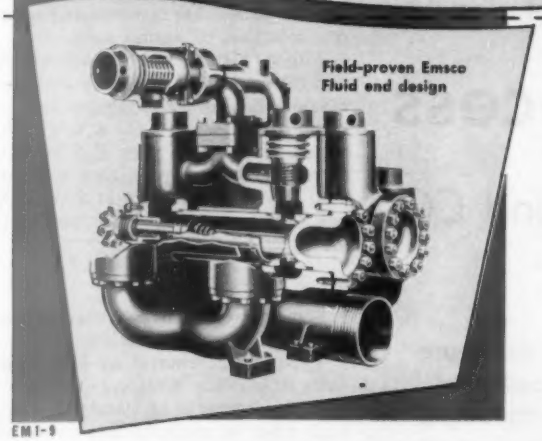

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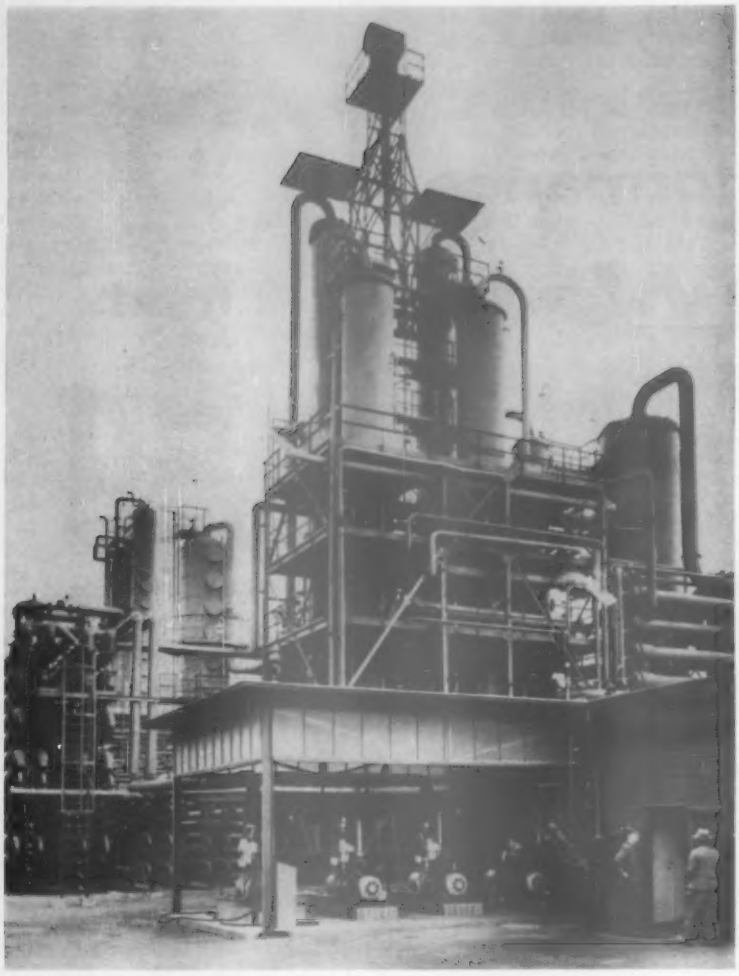


ALKAZID H_2S ABSORPTION PLANT at Messrs. Gelsenberg Benzin AG at Gelsenkirchen, Germany, for purification of hydrogenation gas.

The Alkazid process

...for removing H_2S and CO_2 from natural or plant gas

Concentrated aqueous solutions of amino acids are used in this process. Hydrogen sulfide or carbon dioxide can be removed selectively or simultaneously from industrial gases. The corrosion problem is overcome by using the relatively cheaper aluminum (in place of stainless steel formerly used) in reboilers, exchangers, etc.

BY ROLF LEUHDDEMANN, GUENTHER NODDES, AND HANS-GEORG SCHWARZ
Badische Anilin-& Soda-Fabrik AG, Ludwigshafen am Rhein, Germany

THE ALKAZID process originally developed by Bahr and coworkers[1 2] was devised for the removal of H_2S and CO_2 from natural and synthetic gases. Badische Anilin-& Soda-Fabrik AG, of Ludwigshafen am Rhein introduced the process on an industrial scale to various industries. The process has been developed for the purification of gases and even for the extraction of H_2S from liquid hydrocarbons. It has been installed in more than 50 plants.

Examples of such installations are in Germany's former synthetic-gasoline works which have now been converted to crude-oil processing; in the Abadan, Iran, refinery; in low-temperature carbonization plants in Sweden and Spain; and in ammonia-synthesis works in the Netherlands and Belgium. Alkazid units, especially for the production of high-purity CO_2 for use in the manufacture of foodstuffs, beverages, etc., have been built in Switzerland and Italy. The world's largest Alkazid CO_2 unit is in Japan. Lately, Alkazid units have come on stream in the United Kingdom, South America, and Israel.

The Alkazid process (Fig. 1) is a continuous recycle process in which sour gases are treated with the aqueous solutions in an absorber. The process can be carried out both at normal and elevated pressures. The spent solution is regenerated by means of heat and is then returned to the absorber via the heat exchanger and cooler.

Instead of gases, liquid hydrocarbons containing dissolved H_2S may also be treated with the solution. These solutions are concentrated aqueous solutions of amino acids.

Either Alkazid salt is nonvolatile and their solutions are stable alkaline-reacting liquids. Their absorption capacity for H_2S and CO_2 is very high. When shaken with pure H_2S or CO_2 at normal temperature, they will absorb 70-90 volumes of H_2S or CO_2 per volume solution. Their constants are given in Table 1.

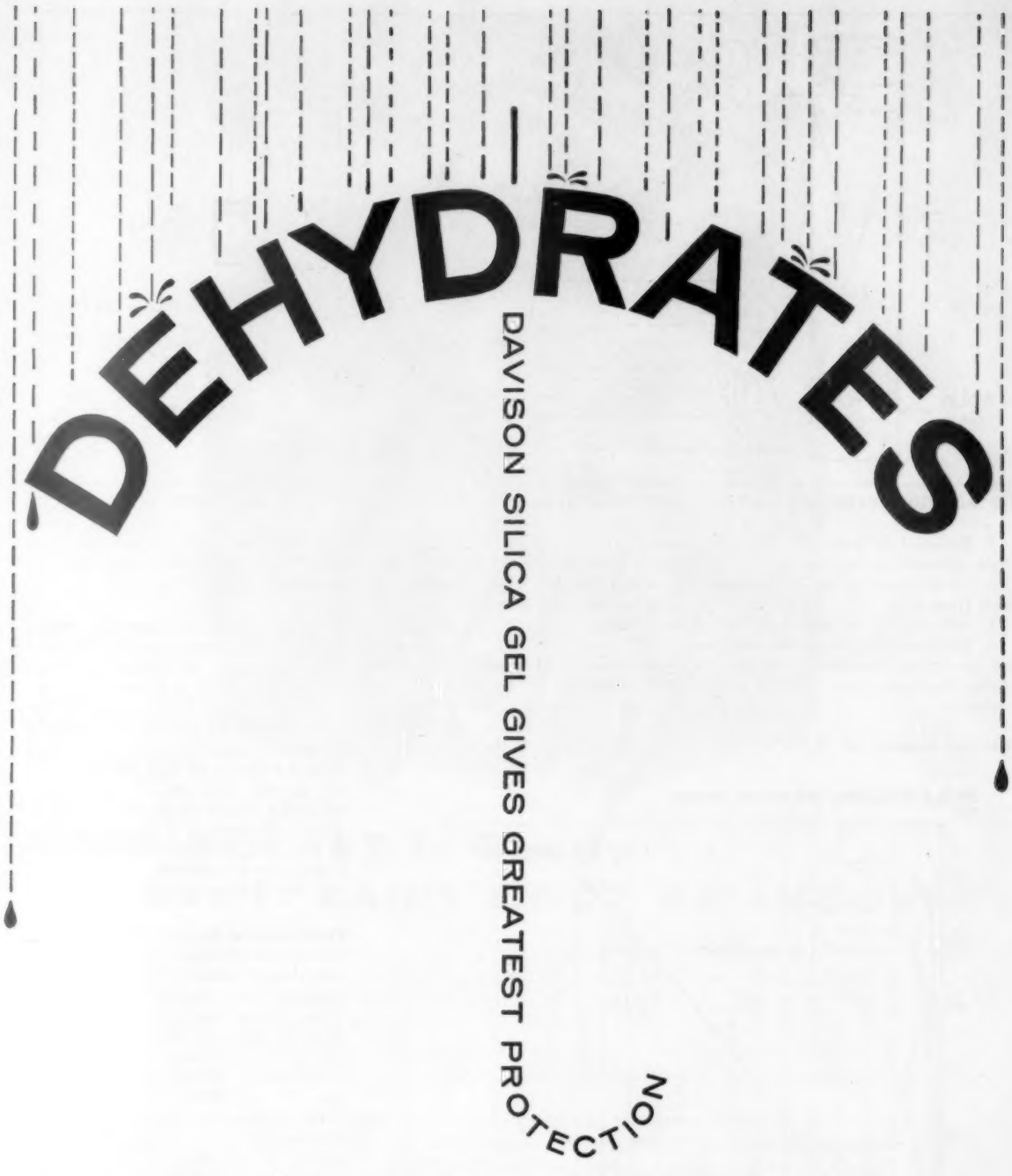
Applications

Some applications of the process are summed up as follows:

1. Selective removal of H_2S from gases containing CO_2.
2. Separation of H_2S and CO_2 from each other in mixtures containing no further components.

TABLE 1—ALKAZID SOLUTIONS

	Dik	M
Specific gravity as supplied	1.2	1.2
Specific gravity in use	1.16-1.18	1.16-1.18
pH	10-12	10-12



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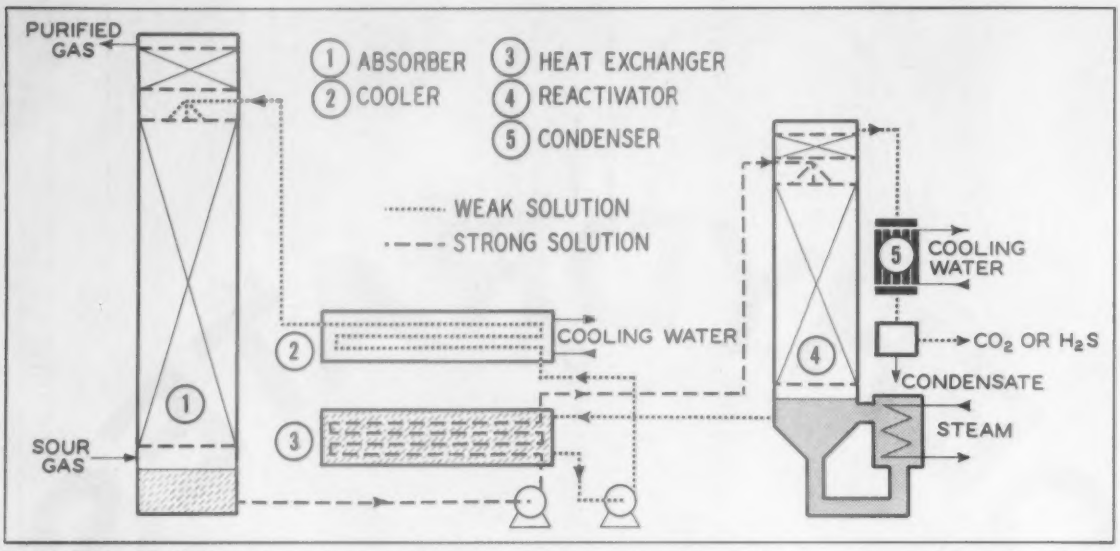
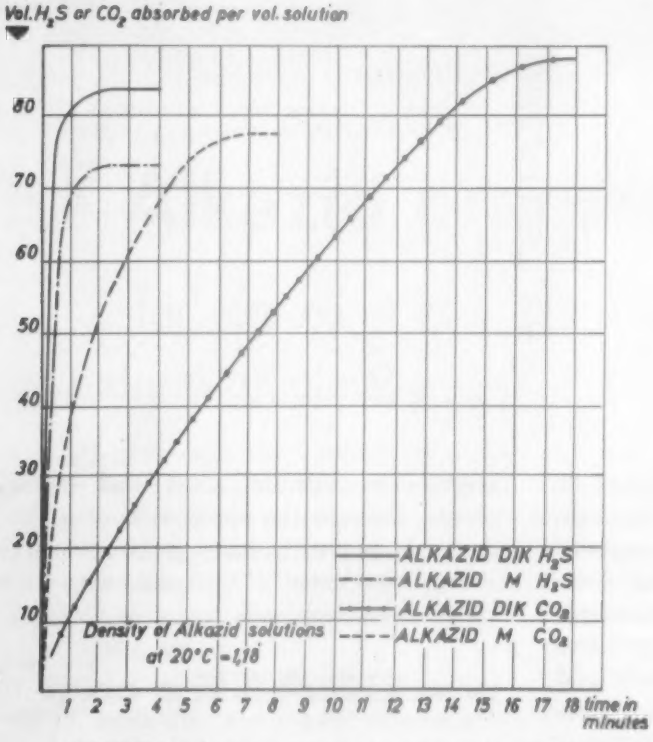


THE ALKAZID PROCESS employs concentrated aqueous solutions of amino acids in a regenerative cycle. Fig. 1.

3. Removal of both H_2S and CO_2 from industrial gases.
4. Purification of liquid hydrocarbons from H_2S.
5. Safe storage of pure H_2S.
6. Recovery of pure carbon dioxide for use in the manufacture of foodstuffs, beverages, urea, and for other purposes.

Selective removal of H_2S . . . The process of removing H_2S from refinery gases (which are generally free of CO_2) by the Alkazid process is very simple and will not be dealt with here.

Separation of H_2S and CO_2 from each other . . . Gases which contain no other components besides H_2S and CO_2 are produced for instance by the Rectisol process. If H_2S is to be removed from such gas mixtures, Alkazid Dik will recover H_2S with a minimum loss of CO_2.



ABSORPTION of H_2S and CO_2 by Alkazid solutions. Fig. 2.

Removal of both H_2S and CO_2 from gases . . . A stream of 650,000 std. cu. ft. per hour of natural gas containing 0.5 vol. % H_2S and 3 vol. % CO_2 is washed at 85 psia. and 78° F. with Alkazid M solution in a tower filled with rings. The purified gas contains 4.4 grains of H_2S per 100 std. cu. ft. and 0.04 vol. % CO_2. The scrubbing efficiency is 98.6% with a steam consumption of 4 lb. per pound of CO_2. Higher scrubbing efficiencies may easily be obtained by regenerating the solution more strongly.

Purification of liquid hydrocarbons . . . Liquid hydrocarbons such as gasoline, and hydrocarbons liquefied under pressure, e.g., propane and butane, often contain hydrogen sulfide which must be removed. Alkazid Dik solution provides an excellent solution to this problem. Effective distribution of the Alkazid solution in the liquid hydrocarbon is essential and is achieved either by washing in countercurrent or, in the case of liquefied gases, by releasing the pressure. After the washing, the two phases are separated in settling tanks. Residual Alkazid solution is removed from the hydrocarbon by washing with water so that no loss of solution occurs. Hydrocarbons dissolve only slightly in Alkazid solution so that losses of hydrocarbon are insignificant.

Safe storage of pure H_2S . . . In many plants hydrogen sulfide is produced at irregular intervals and must be stored in gasometers. On account of

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In almost every industry, during times when supply can more than meet demand, there comes into being a rash of pseudo businesses whose foundations are built solely on the soft sands of opportunism*. The term "Hip Pocket" has become the common denominator for members of this group.

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Consumer and manufacturer alike should remember that Hip Pockets empty quickly in any sort of emergency. We all need a strong Supply Industry — one that is worthy of our support now as well as in times of scarcity.

*Webster defines opportunism as "a taking advantage of circumstances with little regard for principles or ultimate consequences."

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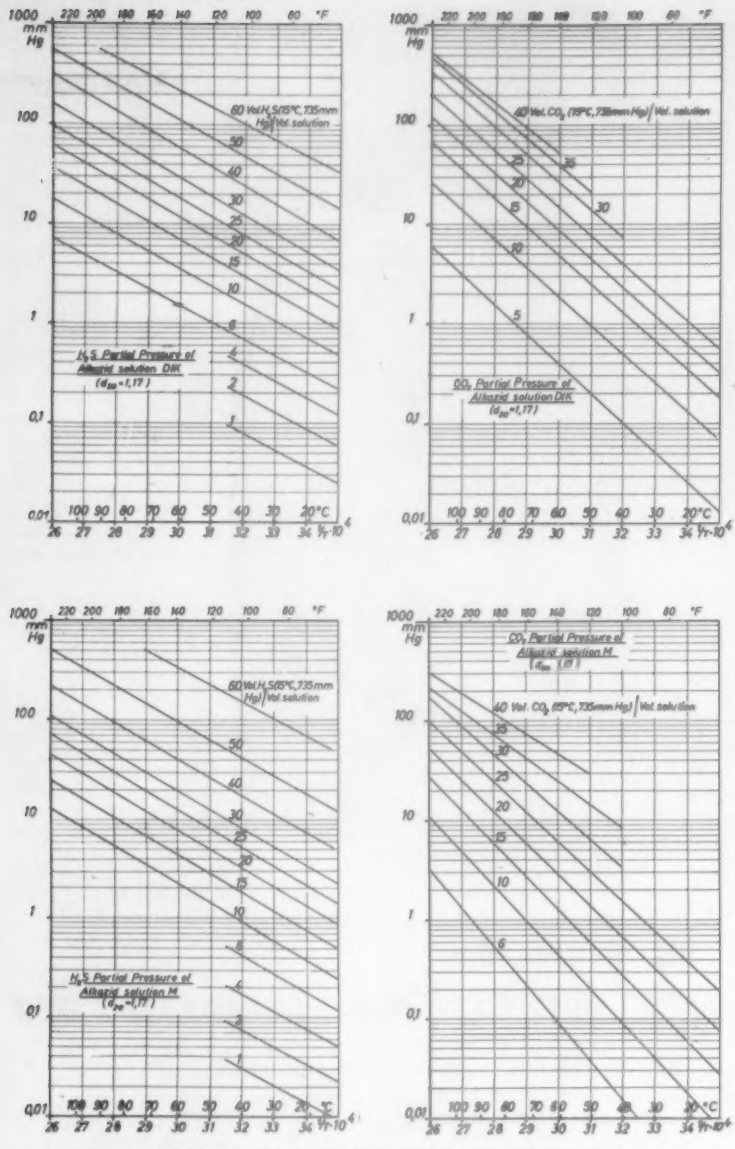
1000 mm Hg
100
10
1
0,1
0,01
60 Vol. H₂S (15°C, 735mm Hg) / Vol. solution
40 Vol. CO₂ (15°C, 735mm Hg) / Vol. solution
H₂S Partial Pressure of Alkazid solution Dik (d₂₀ = 1,17)
CO₂ Partial Pressure of Alkazid solution Dik (d₂₀ = 1,17)
H₂S Partial Pressure of Alkazid solution M (d₂₀ = 1,17)
CO₂ Partial Pressure of Alkazid solution M (d₂₀ = 1,17)
°F
°C
1/T·10⁴

PARTIAL PRESSURE of H_2S and CO_2 over Alkazid solutions. Fig. 3.

the high toxicity of hydrogen sulfide the erection of gasometers for this purpose is often not permitted in towns and other populated areas. In such cases by suspending the H_2S in Alkazid Dik solution the problem of storage can be solved most effectively. The partial pressure of H_2S in an Alkazid solution containing 60 volumes of H_2S per volume of solution is very low. Fig. 3 shows the vapor pressures of H_2S and CO_2.

Advantages of Process

In the selective removal of H_2S from gases containing CO_2, Alkazid Dik solution gives better results than any other washing solution. In order to determine the selectivity of Alkazid Dik and M solutions they were shaken at normal temperature with pure H_2S or CO_2. The volume of gas taken up per volume of solution was measured every minute until saturation was reached. Fig. 2 gives the absorption characteristics of the two Alkazid solutions.

With the two quotients:

$$Q_1 = \frac{\text{vol. } H_2S/\text{vol. solution}}{\text{vol. } CO_2/\text{vol. solution}}$$

determined after 1 minute and Q_2 determined after 2 minutes the selectivity S may be obtained according to the equation $S = 2\,Q_1 - Q_2$. The higher the value of S, the better the selectivity. The results are given in Table 2.

TABLE 2—SELECTIVITY OF ALKAZID SOLUTIONS

(Temperature = 25° C.; concentration = 3.4 moles per hour)

Solution—	Selectivity
Alkazid M	2.2
Alkazid Dik	11.0

Low solubility of hydrocarbons . . . The following table gives the Bunsen absorption coefficient for water and Alkazid Dik solution at 20°-30° C. for various gases:

	Water	Alkazid Dik solution
Methane	0.030	0.006
Ethane	0.041	0.018
Ethylene	0.108	0.030
Propylene	0.099	0.050
Butadiene	0.235	0.108

Owing to the low solubility of hydrocarbons in Alkazid solutions the hydrogen sulfide liberated has a very small hydrocarbon content. This insures a minimum loss of hydrocarbons in the washing process. The very pure hydrogen sulfide liberated from Alkazid solutions is especially suitable for converting into sulfur in a Claus plant. Sulfur produced from hydrogen sulfide containing hydrocarbons is often brownish and impure. No trouble by polymerization of diolefins in Alkazid solutions has been observed.

No volatility of absorbent solutions . . . In contrast to many other washing solutions the amino-acid salts contained in the Alkazid solutions are nonvolatile, so that no loss of washing solution can occur.

Corrosion . . . By substituting comparatively cheap aluminum for rather expensive stainless steel in reboilers, heat exchangers, etc., the corrosion problem has been overcome. Corrosion no longer presents any difficulties in the Alkazid process. This is clearly shown by the fact that a number of Alkazid units have been in trouble-free operation for more than 20 years.

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Floating Seats Give Perfect Seal. Each seat in W-K-M's *Pressure Sealing* Gate Valve consists of two kinds of rubber, formulated to W-K-M's specifications, molded to a hardened steel insert. There is a full bore opening, the same diameter as the port, through the insert.

Soft rubber, for sealing, is on the back side of each seat. Tougher, abrasive-resistant rubber is on the front or gate side. The steel insert is ringed with holes. Pressure forces the soft rubber through these holes, reinforcing the tough rubber and compensating for any wear.

Line Pressure Seals the Seats. In the closed position, the gate forms a primary seal with the raised ring of tough, firm rubber on the the face of each seat. As the line pressure is applied to the valve, the gate is forced against the rubber ring on the downstream seat and compresses it until the gate rests against the hardened steel insert. This provides a tight seal between the gate and the rubber on the face of the seat, and a secondary metal-to-metal seal. The action also forces the soft rubber on the back of the seat tightly into its recess and prevents any downstream flow at this point. The result: a bubble-tight downstream seal.

The upstream seal is caused by line pressure forcing its way into the seat recess behind the upstream seat, moving it against the gate. This pressure is sufficient to achieve a positive seal between the gate and the ring of tough rubber on the face of the seat. At the same time, the raised rim of soft rubber on the back of the seat forms a tight seal with the seat recess.

These double-action floating seats provide tight, positive seals — both upstream and downstream.

Change Seats in Minutes — On the Line! You can change the seats in W-K-M's *Pressure Sealing* Gate Valve *on the line*. The only tools needed are a wrench to loosen the body bolts, and a pair of pliers.

Important Safety Feature: This valve has been designed to automatically relieve excessive body pressure caused by thermal expansion. The excess pressure forces the upstream seat away from the gate, allowing it to bleed into the line.

Additional Advantages: The full bore, through-conduit gate construction provides a perfectly smooth bore through the valve, eliminating pockets or cavities in which foreign matter might accumulate. Result: perfectly smooth flow with no more turbulence or pressure drop than through an equal length of pipe.

W-K-M's *Pressure Sealing* Gate Valve is a two-way valve and may be installed with the pressure on either side. It is especially well suited for block and bleed service since it seals positively both upstream and downstream. The body may be bled of pressure with the gate in either the fully open or fully closed position.

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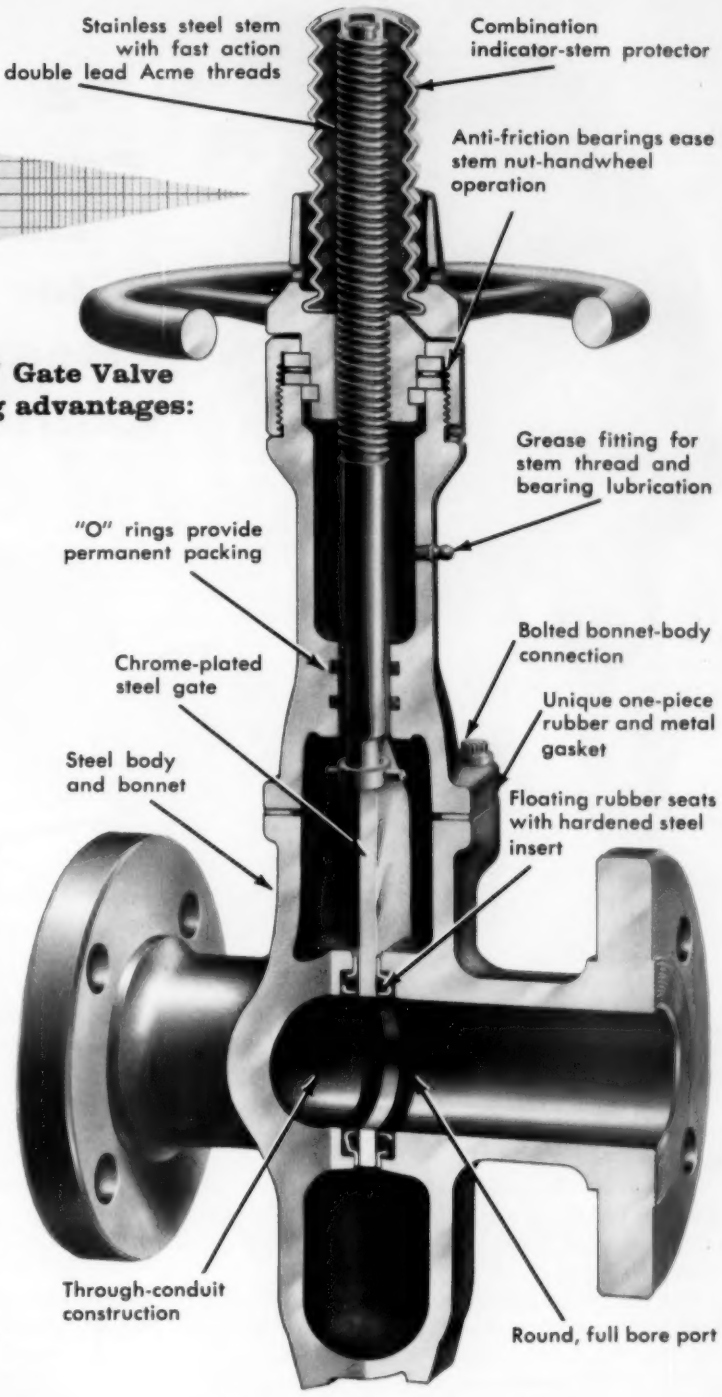
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Steel body and bonnet
Floating rubber seats with hardened steel insert
Through-conduit construction
Round, full bore port

W-K-M's *Pressure Sealing* Gate Valve gives you all these operating advantages:

- **Tight seal both up and downstream in open and closed position**
- **Full bore, through-conduit**
- **Seats fully protected from abrasive action of lading**
- **Non-lubricated**
- **Seats automatically adjust for wear**
- **Automatic relief of excessive body pressure**
- **Ideal for abrasive ladings, light gases, volatile liquids up to 250° F.**
- **Easy to overhaul on the line**

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GR 397

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

Operating costs of gas-recovery plants

A STUDY of more than 188 sets of data indicates the following approximate relationship between cubic feet of gas per barrel and laboratory distillation loss (or Reid vapor pressure):

$$\text{Gas} = 11.5 \text{ Loss} = 3.75 \text{ R.v.p.}$$

This applies to a gas molecular weight of 50, and the volume may range from about 20% larger (40 mol. wt.) for oils delivered under pressure to about 20% smaller (60 mol. wt.) for stabilized or weathered crude oils. (Gas Loss in Topping Crude Oil, The Oil and Gas Journal, May 18, 1959, page 304).

In thermal cracking and viscosity breaking, the cubic feet of gas produced is almost a direct function of the gasoline yield as indicated in Table 1. If more precision is needed, consult "Gas Loss in Thermal Cracking," The Oil and Gas Journal, July 13, 1959, page 133.

TABLE 1
Approximate Yields of Gas by Thermal Cracking and by Viscosity Breaking

10 R.v.p. gasoline yield (%)	Gas, cu. ft. per bbl. 25 mol. wt.	30 mol. wt.	35 mol. wt.
5	120	100	86
10	144	120	103
20	240	200	171
30	348	290	248
40	468	390	334
50	606	505	433
60	782	660	566

In coking, the gas yield varies with the kind of coking process somewhat as indicated in Table 2. The table is based on normal practice, that is, the production of major amounts of coker distillate rather than gasoline or coke.

TABLE 2—APPROXIMATE GAS PRODUCTION IN COKING

Charge stocks: Carbon residue (%)	API gravity: Intermediate base	Naphthene base	Gas, std. cu. ft. per bbl.: Fluid process 20 mol. wt.	Fluid process 30 mol. wt.	Delayed 20 mol. wt.	Delayed 30 mol. wt.	Ultimate* 20 mol. wt.	Ultimate* 30 mol. wt.
5	26	22	163	109	290	193	1,020	667
10	16	14	417	278	302	201	960	640
15	10	8	462	308	334	222	640	427
20	6	4.5	535	356	...	...	591	394
25	3.5	2	614	409	...	...	...	...
30	2	0	685	459	...	...	...	...

*Conducted to the extreme of producing only coke, gasoline and gas.

TABLE 3—APPROXIMATE GAS YIELDS IN CATALYTIC CRACKING*

Yield of debutanized 400 e.p. gaso.	Gas, std. cu. ft. per bbl.: Fluid processes Dry gas†	B-B	Total	Moving bed processes Dry gas†	B-B	Total
30	165	118	283	118	146	264
35	205	144	349	148	176	324
40	266	177	443	191	217	408
45	317-339	201-212	518-551	230-244	246-259	476-503
50	385-422	229-241	614-663	278-304	280-295	558-599
55	473-532	256-272	729-804	342-384	314-334	656-718

*Ranges are for different amounts of recycling in plants of small and large coke-burning capacity. †Fluid gas 31 mol. wt. and moving bed gas 37 mol. wt.

TABLE 4—APPROXIMATE AMOUNT OF GAS PRODUCED IN CATALYTIC REFORMING, STD. CU. FT. PER BBL. FEED

Yield of debutanized reformate	Cu. Ft/Bbl. of Dry Gas for the following pressures: B-B	250 psig.	325 psig.	500 psig.	725 psig.
95	14-21	1,198	1,065	864	574
90	22-70	1,150	1,010	810	535
85	57-130	1,110	960	760	490
80	86-200	1,070	920	715	460
75	123-270	1,030	880	675	410
70	165-315	985	835	645	390
65	over 217	895	735	525	...

The total amount of gas (including BB-cut) produced in catalytic cracking is also a function of the yield of debutanized gasoline as shown in Table 3.

The amount of methane, ethane, and propane (propylene) produced in platinum catalyst reforming are a well defined function of the yield of debutanized reformate (Gases Produced in Platinum Catalyst Reforming, The Oil and Gas Journal, April 20, 1959, page 123) but the amount of hydrogen produced is only an approximation. Table 4 indicates the approximate amount of gases including the BB-cut).

Each refinery is different with respect to total gas production, but for average U. S. refineries the production is now about 570 std. cu. ft. per bbl. crude oil (but only 390 std. cu. ft. during 1956).

Cost of Gas-Recovery Installations

The cost of 1 M.M.c.f. of daily capacity (in the capacity range of 4 to 12 M.M.s.c.f.d.) is about as shown in Table 5. Such costs were discussed in some detail in "What's the Cost of Refinery Gas-Recovery Plants?", published on the Questions on Technology page of the Journal in the July 20, 1959, issue, page 89.

Operating Costs

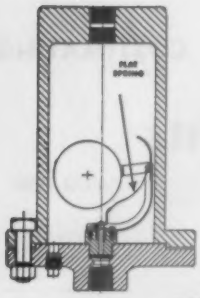
Table 6 shows the approximate cost of operating basic or simple gas-recovery plants that use either gas oil or heavy gasoline as the absorption agent and it is believed that the cost of operating combination absorption-fractionation plants is also much the same as shown in Table 6. The operations in simple plants are absorption, steam stripping of rich absorption oil (or fractionation of enriched gasoline), and stabilization of the recovered liquid.

TABLE 5
Approximate Cost (1956) of Gas-Recovery Plants per M.M.s.c.f.d.

Compression ratio	Basic plants* (thou. dollars)	Including fractionation† (thou. dollars)
1.5	68-87	174-246
2.0	74-96	182-257
4.0	93-119	200-280
8.0	121-155	230-309

*Absorption, stripping or distillation, and stabilization of the recovered liquid. Low costs apply to 34% propane recovery and large costs to 60%.

†Also includes debutanization of gasoline from the associated process (entire refinery or cracking plant, or etc.), separation of propane, butanes, isobutanes, and isopentane, and drying of propane and butanes. Range indicates completeness of the operations and the normal variations in construction.



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Stabilization of the plant gasolines or separation of the various light hydrocarbons is not contemplated. Much steam is required for stripping of rich oil but no stripping steam is required for redistilling the enriched gasoline. However, somewhat more heat is required when heavy gasoline is used as the absorption agent.

In estimating the cost of operating gas-recovery plants it is first necessary to estimate the amount of gas handled by reference to Tables 1-4. As a general guide, 1 M.M.c.f.d. corresponds to the following approximate oil capacities:

	B/D
Avg. 1958 refinery	1,750
Avg. 1956 refinery	2,560
Catalytic cracking	1,670
Catalytic reforming	1,430
Coking	3,300
Therman cracking*	5,000
Crude topping	59,000

Thus, the cost of operating recovery plants often ranges from 2 to 5 cents per barrel of oil. Note especially:

1. Propane recovery ranges from 34 to 60%.

2. No separation of hydrocarbons from one another is involved and only the liquid that is recovered is stabilized. For hydrocarbon fractionation and stabilization of plant gasolines, see Process Costimating No. 54.

3. In plants that employ heavy gasoline as the absorption agent, no stripping steam is needed but somewhat large amounts of heat are required in such plants.

4. Many gas-recovery plants are operated by the operators of the associated process plant (reformer, cat cracker, etc.). This decreases the cost of operation shown in Table 6 by about $7 per day (independent refiners) to $38 per day (major refiners).

TABLE 6—ELEMENTS OF OPERATING COSTS—BASIC GAS-RECOVERY PLANTS OPERATED SEPARATELY
(Cost per M.M.c.f.d. in plants handling 3 to 12 M.M.s.c.f.)

Element	Unit (somewhat standard)	1956 Unit cost	Cost—$ per M.M.s.c.f. per day small	major	See Process Costimating Number
Labor—supervision	0.01-0.06 men/shift	$3.85/hr.†	0.92	5.50	26, 28, 41, and 45
Labor—operating	0.1-0.5 men/shift*	$3.12/hr.†	7.50*	37.50*	
Maintenance	2-3%/yr. of replacement				29
1.5 Comp. ratio		$ 77/M.c.f.d.	3.72 -4.77	5.58- 7.15	
2.0 Comp. ratio		$ 85/M.c.f.d.	4.05- 5.25	6.08- 7.88	
4.0 Comp ratio		$106/M.c.f.d.	5.10- 6.50	7.65- 9.78	
8.0 Comp. ratio		$138/M.c.f.d.	6.62- 8.50	9.83-12.82	
12.0 Comp. ratio		$187/M.c.f.d.	8.00-10.10	11.65-15.20	
Fuel§		35-60 ct./M.M. B.t.u.‡			3, 4, 6, and 30
1.5 Comp. ratio	0.51-0.99 M.M. B.t.u./hr. ‡§		4.30-14.45	4.30-14.45	
2.0 Comp. ratio	0.48-0.96 M.M. B.t.u./hr.		4.03-13.80	4.03-13.80	
4.0 Comp. ratio	0.45-0.93 M.M. B.t.u./hr.		3.78-13.40	3.78-13.40	
8.0 Comp. ratio	0.42-0.90 M.M. B.t.u./hr.		3.53-12.92	3.53-12.92	
12.0 Comp. ratio	0.39-0.87 M.M. B.t.u./hr.		3.40-12.60	3.40-12.60	
Cooling water		1.7 ct./M. gal.			15, 16, and 38
1.5 Comp. ratio	1.8-3.2 M. gal./hr.		0.73- 1.31	0.73- 1.31	
2.0 Comp. ratio	2.0-3.6 M. gal./hr.		0.82- 1.47	0.82- 1.47	
4.0 Comp. ratio	2.8-4.8 M. gal./hr.		1.14- 1.96	1.14- 1.96	
8.0 Comp. ratio	3.5-5.8 M. gal./hr.		1.43- 2.36	1.43- 2.36	
12.0 Comp. ratio	4.2-7.0 M. gal./hr.		1.68- 2.75	1.68- 2.75	
Stripping steam§		45-60 ct./M. lb.			
1.5 Comp. ratio	0.23-0.46 M. lb./hr. §		2.48- 6.62	2.48- 6.62	
2.0 Comp. ratio	0.2-0.4 M. lb./hr.		2.16- 5.76	2.16- 5.76	
4.0 Comp. ratio	0.17-0.34 M. lb./hr.		1.83- 4.90	1.83- 4.90	
8.0 Comp. ratio	0.14-0.29 M. lb./hr.		1.51- 4.18	1.51- 4.18	
12.0 Comp. ratio	0.12-0.24 M. lb./hr.		1.40- 3.90	1.40- 3.90	
Pump power§	1.1-3.1 b.hp.-hr.	21.6 ct./day/hp.‖	0.23- 0.67	0.23- 0.67	13, 14, 21-23, 36
Compression		Gas 20-30 ct./M.c.f.**			22, 24
1.5 Comp. ratio	27 b.hp.-hr.		1.00- 2.05	1.00- 2.05	
2.0 Comp. ratio	43 b.hp.-hr.		1.51- 3.13	1.51- 3.13	
4.0 Comp. ratio	85 b.hp.-hr.		3.07- 6.05	3.07- 6.05	
8.0 Comp. ratio	135 b.hp.-hr.		4.80- 7.20	4.80- 7.20	
12.0 Comp. ratio	170 b.hp.-hr.		5.60-11.20	5.60-11.20	
Total direct operating cost (probable extremes)					
1.5 Comp. ratio			22-31	58-69	
2.0 Comp. ratio			23-33	59-70	
4.0 Comp. ratio			26-36	63-73	
8.0 Comp. ratio			29-38	67-77	
12.0 Comp. ratio			32-43	71-82	
Laboratory control	0.01-0.03 men/shift	$3.40/hr.†	0.81	2.45	
Obsolescence, insurance, taxes and interest (7%/yr. of replacement cost)			16.10	20.70	
Other indirect costs (total)			17.00	23.00	

*If operated as a separate plant. In small refineries the operators of the associated gas-producing process often also operate the gas-recovery plant. Note that major refiners use much more labor than independent refiners.

†Average U. S. wages including 27% burdens.

‡Heat absorbed. The cost of such heat as steam is 45-60 ct./M.M. B.t.u., or 29-58 cents if oil heat is supplied originally by a pipe still.

§Stripping steam is not all the steam required. Note also the fuel heat which may be supplied in part or all by steam, and note pump power which is considered here as electrical power. No stripping steam is used in plants that use heavy gasoline for absorption.

‖For electricity at 9 mills. Steam-driven pumps could increase the cost 10 fold.

**Gas engine drives.

THIS BALL, water-inflated, is used to make hydrostatic tests of one Florida pipeline.

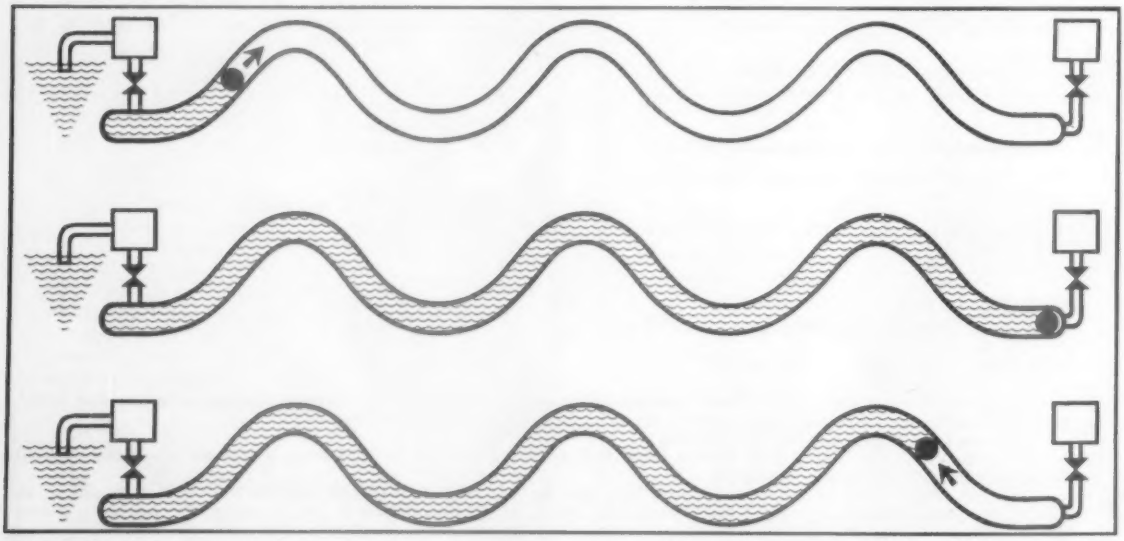
Rubber balls clear water from line

By LEON BROOKS
Chief Engineer, Williams Pressure Service Co.
Shreveport, La.

THE VERSATILITY of expandable rubber spheroids in hydrostatic testing of pipelines was demonstrated on the recently completed Houston Gas & Oil Corp.'s lines in Florida.

Use on several hundred miles of this line tested by Williams Pressure Service Co. grew primarily out of the necessity of using compressed air rather than natural gas for removing test water from the line. For the right-of-way, being new, had no local sources of gas.

But compressed air presents problems. The volumes and pressures required to run a scraper fast enough to avoid bypassing of air are far beyond the capacity of even large portable compressors. In the 24-in. lines in Florida, approximately 1,900 c.f.m. would have been required to meet minimum conditions and even greater



AIR LOCKS, which put excessive loads on air compressors are prevented by maintaining a solid water column throughout filling, testing, and emptying operations. Two-way travel of rubber spheroid permits it to be inserted and removed at the same point, eliminating the necessity of cutting line after testing to insert a pig.

RUBBER BALL used in testing line has 3-in.-thick wall with countersunk valve for inflating. After being placed inside the pipe, they are inflated with a carefully measured quantity of water, so that the seal between rubber and pipe wall is complete.

capacity would have been demanded to overcome air locks.

Yet the portable compressors regularly used in this work have capacities of only 600 c.f.m. to 900 c.f.m. Extra compressors could have been added, but their expense in relation to the time they were actually in use would have been prohibitive. So it was decided to go to rubber balls instead of scrapers.

The balls proved to have multiple advantages. Not only did they provide the tight seal but, because they could be run in two directions, they sharply reduced the formation of air locks.

Testing Procedure

When testing water was pumped into a section of line, a ball was run in ahead of it and left inside at the far end. Then, upon completion of testing, after testing pressure was bled off and fill valves opened, air was merely pumped into the far end. This caused the ball to return, pushing the water back out to its original source.

Thus it was unnecessary to open the far end for inserting a water-removal scraper. The line remained a solid column of water until displaced by the air behind the ball. It denied any opportunity for air to enter the water columns. Otherwise, when lines are opened for the purpose of inserting scrapers, it is unavoidable to introduce a quantity of air in front of the scraper. This air, even in gently rolling terrain, can build up heads which will multiply by several times the load on the air compressors.

The ability of the ball to run in two directions effected further economies. It permitted more economical use of the air compressors by means of bottling air in adjacent test sections; it reduced the number of moves of hydrostatic-testing equipment along with time required for rigging up. In several instances, as many as four 20 to 30-mile sections were tested with a single setup. The water was returned each time to the "fill" site from which it was immediately pumped into the next section.

Drying

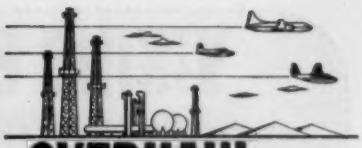
In this job it was considered advisable to run through a slug of alcohol for extra drying as there was to be no "on-stream" pigging after the line was placed in service. Frequently this is done along with water removal by inserting pigs at both ends of the alcohol slug between cleaning air or gas and the water column.

But the higher air pressures required to overcome the friction of the extra balls and its attendant danger of explosion made a separate drying operation more feasible. For this, methanol between two balls was run through each section.

Here the rubber spheres offered a safety feature. Their tight seal reduced mixture of the methanol with air and the absence of any metal parts eliminated the hazard of sparks resulting from metal to metal contact.

Description of Rubber Balls

The rubber spheroids used in this operation were recently developed by F. H. Maloney Co. of Houston. They have a wall approximately 3-in. thick with a countersunk valve for inflating. Before inflation they have diameters slightly smaller than the in-



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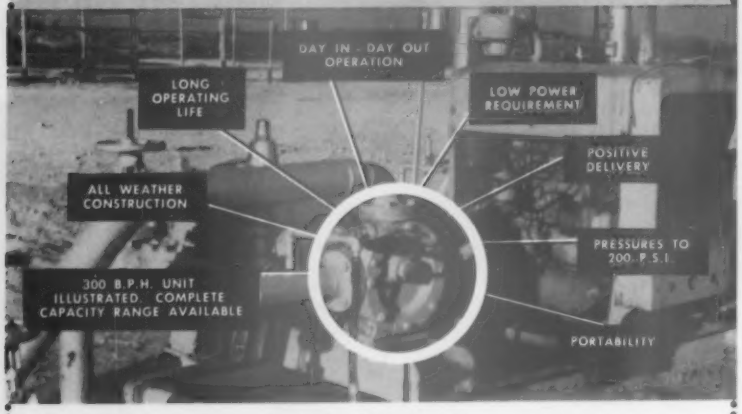
VIKING PIPE LINE

GATHERING PUMPS GIVE YOU...



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VIKING PUMP COMPANY

Offices and Distributors in Principal Cities • See Your Classified Telephone Directory

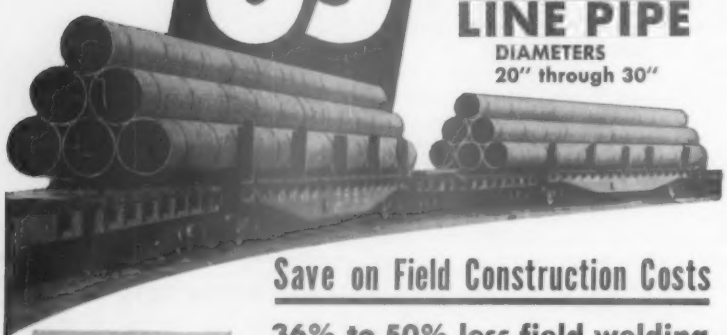
CEDAR FALLS, IOWA, U.S.A.

In Canada, it's "ROTO-KING" Pumps

Now Available IN 63 FOOT LENGTHS

API 5LX Expanded LINE PIPE

DIAMETERS 20" through 30"



Save on Field Construction Costs

36% to 50% less field welding

There are less welds per mile of pipe when you specify Master 63 foot length line pipe instead of 40 foot lengths.

Pipe manufactured to latest API 5LX specifications for high-test line pipe.

API CERTIFICATE
No. 1055
Issued
September 29, 1949

Large Diameter Pipe
Custom fabricated pipe from 20" diameter and up for piling, water lines, etc.

MASTER TANK & WELDING

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side diameters of the pipe to be tested.

They were first inflated outside the line to a diameter slightly more than the inside diameter of the pipe, care being taken to remove all air. Then water used for inflation was removed and measured. After the ball was inserted in the line, exactly the same amount was pumped back into it. Only in this way can the seal between rubber and pipe wall be controlled.

Hydrostatic-testing equipment was selected for the Houston gas and oil tests to meet requirements of volume, head, and mobility. Filling equipment consisted of two pumping units. One was a low-head pump which could be transported by small truck and easily handled by a gin-pole truck. This could be set down near water sources even when access was poor. It flooded the main fill pump, a multistage centrifugal pump, powered by twin diesel engines, mounted on a float or lowboy.

These units together were capable of packing the line to pressures of approximately 550 psi. By having twin engines, filling could be continued in the event one engine was down. A light plant and stock of 6-in. Victaulic coupled pipe was carried on the same trailer with the large fill pump.

The pressure unit was a positive-displacement-type pump mounted on a truck along with a water-storage tank. A power take-off from the truck engine provided a drive for the pump.

Testing instruments included an indicating gage, recording gage, and deadweight gage. All water connections were of the quick coupling type.

Canada Takes Spotlight

ON AUGUST 17, the Journal will present a special report on Canada.

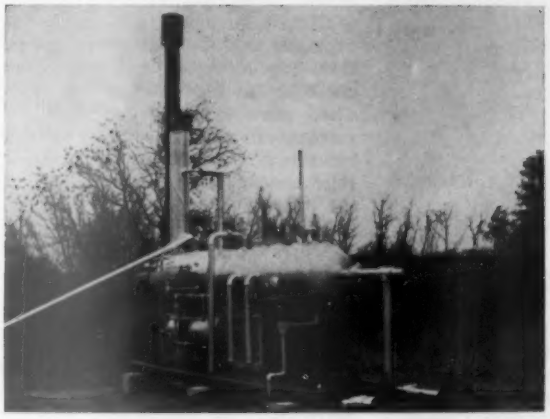
The 46-page roundup will feature top-notch articles on Canadian pipelining, exploration, production, refining, and drilling. Also scheduled is a table showing reservoir data for all oil and gas fields in western Canada.

Of special interest to the pipeliner will be an exclusive report on "Equipment and Measures for Meeting Cold-Weather Conditions in a Crude-Oil Gathering System."

Watch for the Journal's Report on Canada, August 17.

▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .



Dehydrator gives high depression

. . . of dewpoints—as high as 85 and 90°, according to the manufacturer. The unit is a horizontal glycol type made in two basic models. One has an integral three-phase separator and glycol heating coil in the separator base. The other comes without a separator but with a combination inlet scrubber and straightening vane to remove any liquids entrained in the gas.

Both units can be obtained with two or four trays, according to the dewpoint depression desired. Gas-glycol contact is automatically controlled according to gas volume, permitting high contact efficiency at low and high flow rates. A flame arrestor is used to prevent fire hazards. The dehydrator comes prepiped, shop hooked up, and insulated and is ready for use after the well and pipeline tie-in. **Contact Manufacturer: National Tank Co., P. O. Box 1710, Tulsa, for details on glycol dehydrator.**

●

Filter cleans up to 43 g.p.m.

. . . and comes in sizes for service at pressures from 0 to 5,000 psi. and temperatures from —65° to 275° F. The filter has fine wire-mesh elements made rigid by a process that bonds all cross wires to each other and is fabricated into high-area corrugated construction.

Permanent, cleanable, and reusable stainless-steel filter elements are obtainable for the Rigimesh filter assembly for 98% removal ratings of 2, 5, and 10 m.-size particles. **Contact Manufacturer: Aircraft Porous Media, Inc., 30 Sea Cliff Avenue, Glen Cove, N. Y., for details on Rigimesh filters.**

●

Automatic recorder-programer

. . . for oil wells offers a completely automatic system for programing and recording oil-well production and test data. Components of the new POR system (production operations recorder) vary according to the needs of the individual producer. But a typical system would include equipment for recording and translating data as well as for programing well operation. Optional telemetering equipment is also available.

The programing equipment automatically schedules production and test-well routines as well as LACT operations. The programing equipment also automatically transfers well production from test to group manifolds as required or shuts down wells during emergencies. Data is recorded in either printed or punched-tape form. The punched tape can be machine-translated into visual form by a visual output unit. Or it can be translated into typewritten form by an automatic typewriter or into standard punched cards by an automatic output translater. Also data can be automatically plotted into graphs. **Contact Manufacturer: Fischer & Porter Co., 211 Jacksonville Road, Hatboro, Pa., for details on oil-well recorder-programer.**

Send this **Showcase Coupon**

to the Manufacturer of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

Described in OIL AND GAS JOURNAL - Issue of August 3, 1959

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

Mobile and Collapsible Building

. . . now available can be erected and ready to use in only 20 minutes, the maker says. The Model S-816 building can be used for a variety of oil-industry needs. It can be erected to meet the needs of camps, or several units can be joined together.

The knockdown building collapses into a compact package, providing fast handling. It is built ruggedly and mounted on steel skids to withstand weather and field use. Walls are securely held to steel corner supports with lock bolts. **Contact Manufacturer: Porta-Kamp Co., P. O. Box 7064, Houston, for details on Model S-816 building.**

Batch control totalizer

. . . now being produced gives accurate flow measurement where quantitative liquid controls are needed. A limit switch can be incorporated to activate an alarm signal or other controls upon completion of a batch.

The Type 252 totalizer mounts on any Sparling main-line meter. To operate it, manually set a pointer on the 4-in. dial to the desired amount. As flow passes through the meter, the hand returns to zero, indicating at all points the quantity still to be run. Accumulated total is shown on a six-digit straight-reading totalizer. The device is housed in a metal case with locking hasp so it can be installed outside. The case protects it from moisture and tampering. **Contact Manufacturer: Sparling Meter Co., 225 North Temple City Boulevard, El Monte, Calif., for details on Type 252 totalizer.**

●

New crude-oil treater

. . . is soon to be available. The treater tank measures 11 ft. 8½ in. long. From the lower portion to the top deck, it is 5 ft. 9 in. high. Width across the top is 4 ft. 4 in. Width across fire box is 2 ft. 6 in.

An outstanding feature of the unit is the cleaning method. Cleaning can be done in 15 to 20 seconds by turning a crank one revolution forward and back, the maker says. When the crank is turned, a master valve on the drainoff line is opened and the cleaning rakes in the bottom of the treater push the bottom sediment from the edge of the compartment down to the drainoff opening.

A shaft extending from the treater connects to two shafts inside. One shaft goes to the oil outlet valve and the other to the water outlet valve. These allow the pumper to adjust the valves from the outside. The two valves are controlled by an automatic fluid control in the back portion of the treater.

The treater is built to operate on pressures up to 30 psi. When the unit gets in production, higher pressures are expected. **Contact Developer: Gill Oil Co., P. O. Box 96, Carbondale, Ill.**

●

Bottom-hole assembly

. . . for hydraulic free-pump installations just made known has a cone-shaped landing head made integral with the standing-valve shoe to permit running and landing the parallel string independently of the main string. Noteworthy features include a pressure-balanced seal combined with a spring lock that requires no rotation or other actuation for seating or unseating. The lock is provided only as a convenience in landing and spacing out as hydraulic pressure will not unseat the seal.

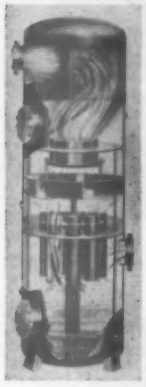
The bottom-hole assembly has a tube type of gas anchor with a relatively high gas-separating capacity. **Contact Manufacturer: Fluid Packed Pump Co., Los Nietos, Calif., for Bulletin EC-5902.**

●

Stabber-spinner to speed drilling

. . . and make operations safer has just been revealed. The Spinomatic device eliminates spinning of the chain and offers a way to reduce crew fatigue. Operation comprises four steps. The unit is moved from the retracted to the extended position where the yoke and retainer arms hold the stand in position for stabbing. After stabbing, the rollers spin up the connections and the tongs make it up. Then the rollers are released, the slips removed, and the stand is ready to lower as the unit is retracted. **Contact Manufacturer: Ideco, Inc., P. O. Box 1331, Dallas, for details on Spinomatic.**

Gas cleaner uses four phases



. . . to achieve high efficiency in the removal of mechanically entrained dust and oil. The Type M-P cleaner not only has more phases of scrubbing than older types but also more phases of separation of the liquid from the gas—six phases. Another unusual feature is that the unit provides internal control of the amount of scrubbing medium in circulation in proportion to the gas flow. The maker says that dust-removal efficiency is as high at low loads as at rated capacity, making the cleaner applicable to systems having wide hourly load swings as well as to those with seasonal variations.

The cleaner comes in sizes from 18 to 72 in. with capacities up to 18 M.M.s.c.f. of gas an hour at 1,000 psig. and for any desired design pressure. **Contact Manufacturer: Buflovak Equipment Div., Blaw-Knox Co., Buffalo, N. Y., for details on Type M-P gas cleaner.**

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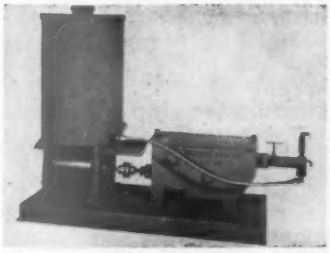


Motor-driven chemical pump

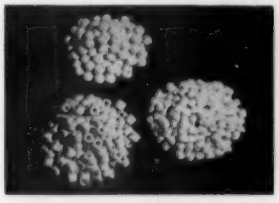
. . . developed recently can be adjusted in a few seconds to feed any volume from 0 to 64 gal. a day. Key to its operation is an index wheel with 10 push-pull pins governing the number of injections per minute. The operator merely sets each pin to add or skip an injection stroke with every revolution of the index wheel. A printed chart gives correct settings for any desired feed volume.

Further adjustment is possible by varying the stroke length. This allows more than 30 positive feed settings. The pump handles injection pressures to 2,000 psi. with a ⅜-in. piston and close-coupled ¼-hp. motor. **Contact Manufacturer: Western Machine Co., 3930 Truman Road, Kansas City 27, Mo., for details on chemical feeder.**

Multipurpose pipe coating machine

. . . just developed can be used as a cleaning and tape-wrapping machine with adhesive tapes, or it can be equipped with a coating shoe and used as a cleaning, coating, and wrapping machine.

With counterrotating cleaning heads, coating shoe, and the revolving wrapping head, the combination machine handles work formerly requiring two machines, extra side booms, and cradles. The machine comes in sizes for pipe from 3 to 36 in. and promises to reduce costs and speed pipe coating. **Contact Manufacturer: Crutcher-Rolfs-Cummings, Inc., Box 2073, Houston, for details on pipe-coating machine.**



New refractories for petrochemical

. . . and petroleum processing have been made available. One is an alpha alumina catalyst carrier with a thin, porous outer shell surrounding the core. It is expected to improve recovery of precious-metal catalysts. The size of the core can be regulated to control catalyst penetration.

The other is a zirconia carrier capable of surface areas up to 70 sq. m. **Contact Manufacturer: Norton Co., Worcester 6, Mass., for details on new catalysts.**

•

Coal tar-epoxy coating

. . . just brought out can be cold-applied to protect metal surfaces against corrosion. The coating is a unified blend of coal tar and epoxy resins that is activated by a special hardener. The two-package coating (Kaetar 35) can be used on pipe, tanks, metal structures, marine installations, and underground pipe.

Weight per gallon is 10.9 lb. Coverage ranges from 80 to 150 sq. ft. a gallon at 8 mils thickness. **Contact Manufacturer: Kansas Paint & Color Co., 132 North Mosley, Wichita, Kans., for details on Kaetar 35.**

Send this **Showcase Coupon**

to the Manufacturer of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

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Described in OIL AND GAS JOURNAL - Issue of August 3, 1959

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ADDRESS.....

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SPECIFY
500 TON for
LONGER
THREAD LIFE!

Protects more tool joint threads than any other compound!

Sold ONLY through supply stores

MONEY BACK GUARANTEE

USE JIMMIE GRAY DOPE BRUSHES

PETROLEUM DISTRIBUTING CO.
BOX 203 • HOUSTON, TEXAS • CApitol 4-9641

SHOWCASE . . .

New Literature

Small-pipe welding

. . . is covered in two technical articles reprinted in a 12-page brochure. The articles are entitled "Fabrication of Small Piping by Welding and Brazing" and "Designing for Welded Systems of Small-Size Pipe."

The first work defines and describes welding processes applicable to the joining of small pipe. It covers applied welding engineering, fields of application, welding processes and equipment, and brazing techniques.

The second article concerns itself with principles of welding and brazing design, and how these can be applied to various pipe metals. **Contact Manufacturer: Air Reduction Sales Co., Div. of Air Reduction Co., Inc., 150 East 42nd Street, New York City 17, for Brochure ADR 118.**

New heat-exchanger catalog

. . . explains where Trufin, an integral finned tube, should be used, and how fins affect the design of heat exchangers and fouling factors. The 20-page literature gives a comparison of Trufin and bare-tube-exchanger costs and includes bare tube-to-Trufin conversion charts for various alloys. **Contact Manufacturer: Wolverine Tube Div., Calumet & Hecla, Inc., 17200 Southfield Road, Allen Park, Mich., for Design & Cost Comparison of Heat Exchangers Using Wolverine Trufin catalog.**

New gas-lift valves

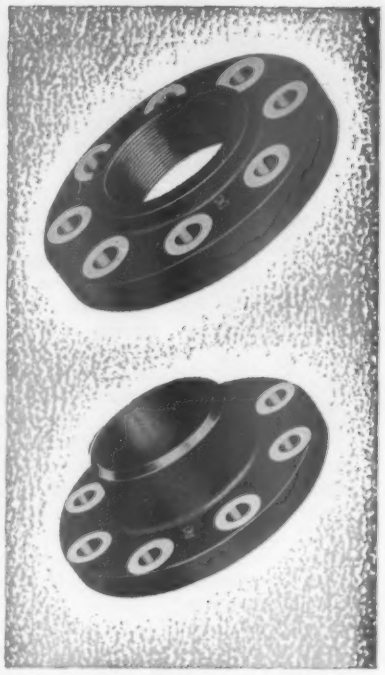
. . . called Types WF-3 and WFM-3, produce stripper wells successfully, as described in a new, obtainable folder. It includes several types of installations which are producing the wells at the present time.

The method uses gas lift without surface controllers and without large-volume gas lines, according to the folder. **Contact Manufacturer: Merla Tool Corp., P. O. Box 2576, Dallas, for Types WF-3 and WFM-3 Gas-Lift Valves folder.**

Glassed ductile-iron fittings

. . . bulletin contains charts, photomicrographs, fitting specifications, and general descriptive data. Charts compare ductile iron with mild steel, and grey iron in terms of tensile strength, yield strength, and elongation.

Two-page Bulletin 977 notes that

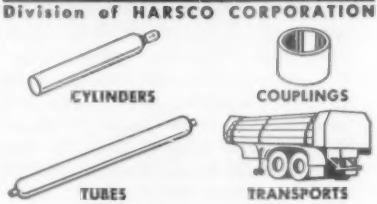


HARRISBURG FLANGES

Harrisburg Drop-Forged Steel Pipe Flanges are made to A.S.A. standards for oil companies, ship builders and pipe fabricators. They come in threaded, butt-welding, slip-on welding, Van Stone and blind types and are shot-blasted and dip-coat finished with a rust preventative black lacquer. Be sure you make it Harrisburg when you want flanges.

More than a Century (H) in Harrisburg 6, Pa.

HARRISBURG STEEL CO.
Division of HARSCO CORPORATION



the fittings, at normal operating temperatures, can be subjected safely to sudden shock of 180° F. when grey iron is used as the base metal. **Contact Manufacturer: Advertising Dept., Pfaudler Co., 1093 West Avenue, Rochester, N. Y., for Bulletin 977.**

Solid-front gages

. . . are housed in a rigid case with integrally cast front shield to protect personnel in the event of a blowout, according to new Brochure 500SF.

Overpressure conditions are relieved by a full nylon blowout back. The new four-page brochure describes the pressure-indicating and test gages and gives complete construction details with diagrams and photos.

Separate sections spell out gage specifications, materials of construction, standard graduations, types of cases, and rings, gage dimensions, and weights. **Contact Manufacturer: Crosby Valve & Gage Co., 43 Kendrick Street, Wrentham, Mass., for Brochure 500SF.**

New engine log book

. . . printed as a service to owners of diesel engines, covers 13 months of operation and contains space for daily entries on fuel and lube-oil consumption, parts, service, repairs, etc. Monthly entries may be transferred to a 12-month summary sheet.

A post card is enclosed with which the operator may order a new book when the old one is used. The book is bound in smudgeproof covers. **Contact Manufacturer: Engine Div., Caterpiller Tractor Co., Peoria, Ill., for Booklet 20167.**

Fishing-cable guide

. . . covers side-door fishing methods in 12 pages. The informative field handbook discusses methods and equipment used in fishing for wireline tools in either a cased or open hole. It gives illustrated operating and maintenance instructions and includes a price list. **Contact Manufacturer: Bowen Itco, Inc., P. O. Box 4587, Houston 13, for Fishing-Tool Guide.**

Drilling-clays brochure

. . . presents the case for attapulgus clay as a component for oil-well drilling muds in contaminated fresh water as well as salt-water systems. The literature is illustrated with charts and graphs comparing various characteristics of attapulgite and other commonly used clays.

Figures show yields in fresh water, salt, and gyp systems. Studies into the stability of various-type drilling muds in contaminated systems and under

New Kidde carbon dioxide portables awarded highest U.L. rating!

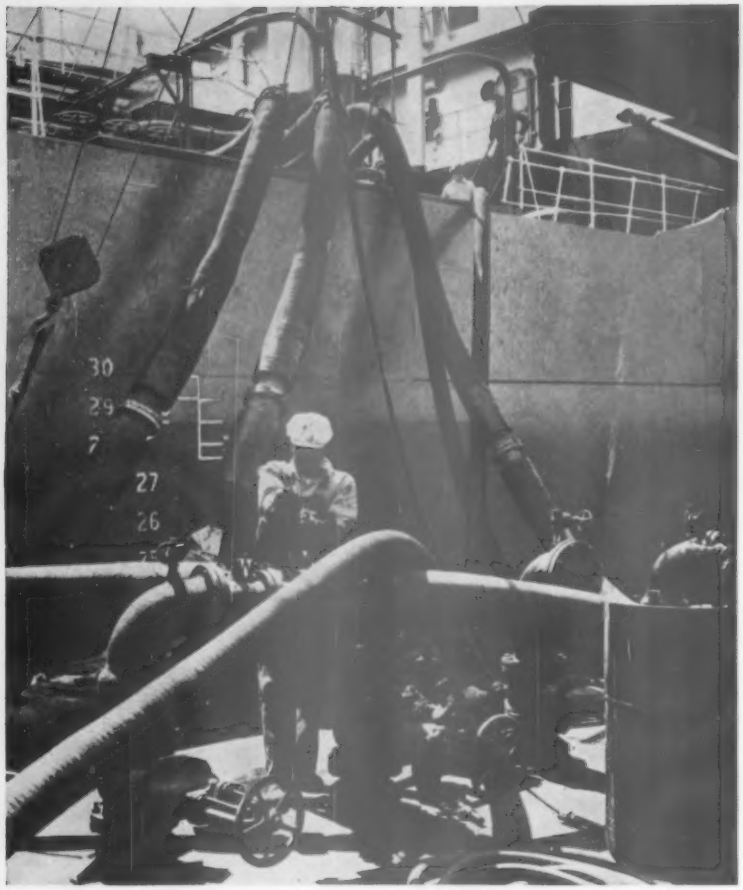
Belleville, N. J. June 1—A spokesman for Walter Kidde & Company announced here today that six of the company's new portable fire extinguishers have been awarded the Underwriters' Laboratories highest ratings for their respective capacities. To those interested in fire safety, this means that, pound for pound, these new Kidde units have more fire-killing power than any other carbon dioxide extinguishers on the market today.

Available in 10, 15 and 20 pound capacities, in either squeeze valve or trigger models, these power-packed Kidde units feature new hose and discharge horn assemblies, which are responsible for their extra fire fighting ability. This hose-horn combination is also being offered as a replacement unit for existing 10, 15 and 20 pound carbon dioxide units, and when attached will upgrade their effectiveness equal to the new ratings.

For more information on these top-rated Kidde carbon dioxide portables write Kidde today.

Kidde

Walter Kidde & Company, Inc.
854 Main St., Belleville 9, N.J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver



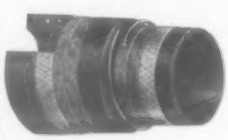
20% lighter than cotton duck but just as sturdy and flexible... Quaker Thermoid OS&D Hose

Strong but light. Extremely rugged but flexible. That's Thermoid-Quaker "Quaflex" Oil Suction and Discharge Hose.

It's lighter than reinforced cotton-duck hose, but it won't expand under pressure. It won't collapse under suction. It's exceptionally kink- and crush-resistant.

For more details, call your local Thermoid distributor, or write to *Thermoid Division, H. K. Porter Company, Inc., Tacony and Comly Streets, Philadelphia 24, Pa.*

HERE'S WHY: Separate layers of nylon tire cord surround a helix of high-tensile spring-steel wire in Thermoid-Quaker "Quaflex" Oil Suction and Discharge Hose. That's why it's just as sturdy and flexible as cotton duck, although lighter in weight.



Nylon tire cord for lightness, strength.

THERMOID PORTER DIVISION

H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY DE MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

high temperature conditions are described, and results are shown graphically.

Comparisons are also made of water-loss properties between attapulgus drilling clay and other mud systems. The 12-page publication discusses application of the clay in fresh water, salt water, gyp, oil emulsion, and completion mud systems.

It presents the relative economics of using attapulgus drilling clay in fresh water systems and contaminated systems. **Contact Manufacturer: Minerals & Chemicals Corp. of America, Menlo Park, N. J., for Technical Information 552.**

Acidproof cements

. . . and their various recommended applications are outlined in newly revised Bulletin 5-2. It details the two factors which determine proper acid-resistant cement for a particular application: the corrosives involved and the maximum temperatures.

The bulletin also contains a resistance characteristics chart for your reference. **Contact Manufacturer: Atlas Mineral Products Co., Mertztown, Pa., for Bulletin 5-2.**

Flowmeters, flowswitches, manometers

. . . are detailed in a new 40-page catalog, which covers all basic information including material composition of components, design characteristics, mounting methods, and available scales. The literature discusses maximum application temperatures and pressures, direction of flow, pipe-connection locations, and other data necessary for installation and operation of flowmeters.

Also included is a discussion of a new manometer for use with water, glycerin, mercury, or oil. **Contact Manufacturer: Seico Instrument Div., Eclipse Fuel Engineering Co., Rockford, Ill., for Seico Flowmeter catalog.**

Industrial Rotocycle meter

. . . which incorporates a special case design that eliminates elbows or manifolds, is described in two-page Bulletin OG-415. The photo-illustrated bulletin includes specifications and detailed cutaway views of the meter and various registers.

Designed specifically for LACT systems and available with small reset, large reset, nonreset, or printing register, the meter measures flows ranging from 20 to 100 g.p.m. **Contact Manufacturer: Meter & Valve Div., Rockwell Mfg. Co., 400 North Lexington Avenue, Pittsburgh 8, for Bulletin OG-415.**

Continental-Emsco Co. appoints

. . . William G. Sharp to the post of manager, export division, New York City; and JoEarl Morris to manager, Continental-Emsco Co., C. A., Caracas, Venezuela.

W. G. Sharp

JoEarl Morris

Sharp will direct sales and service of C-E equipment throughout 35 foreign countries where Continental operates or has agents or representatives. He has been a C-E employe 12 years, and previously was manager of C-E's Venezuelan company.

Morris, a veteran of 19 years with the oil-field equipment supplier and manufacturer, will direct activities of the two offices and three supply stores which the company operates in Venezuela. Morris, formerly assistant manager of Continental-Emsco Co., C. A., will continue to headquarter in Caracas.

PESA completes drivers' manual

. . . and now is distributing the 51-page publication to member companies. The Petroleum Equipment Suppliers Association spent several months of research before offering the pocket-size manual. It's tabbed for quick reference and is enlivened by the use of cartoon-type color illustrations.

Major divisions of the manual are: (1) vehicle operation; (2) automobile and truck maintenance; (3) when there is a vehicle collision; and (4) accident reporting.

Edward R. Burkardt elected v.p.

. . . in charge of tool sales of J. H. Williams & Co., Buffalo manufacturer of wrenches, tools, and drop-forgings. The election took place at a recent directors' meeting of United-Greenfield Corp. of Chicago. Burkardt joined Williams 5 years ago as sales representative in the Los Angeles area. He was transferred to Buffalo as sales manager of the company's tools division the following year.

E. R. Burkardt

The new vice president succeeds John B. Perkins, who retired last month, following 45 years with Williams.

Canadian company offers

. . . attractive pipe-delivery service in the face of a tight steel market. The firm—Canadian Western Pipe Mills, Ltd., of Port Moody, B. C.—has already supplied 715 miles of line pipe to buyers in widely divergent areas in the United States.

Ralph Weisinger, the company's managing director, stated that there were two main reasons why his plant could guarantee uninterrupted deliveries to the United States:

First, 3-year labor contracts had been negotiated in 1958 between Canadian steel mills and employes, and second, large pipe-manufacturing capacities set up to serve future requirements of the Canadian oil and gas industry are not fully utilized at the present time because of some uncertainty in development work in Western Canada pending the outcome of the Borden report.

J. A. Schaefer named manager

. . . of the Houston branch of Central Scientific Co., Chicago, according to John T. Gossett, president. Schaefer formerly was Pittsburgh representative for the company, which he joined in 1950 as an assistant in the purchasing department. He later was transferred to the export department, and from 1953 to 1958 served as a sales representative in Ohio and West Virginia.

J. A. Schaefer

Johnston Testers, Inc. appoints

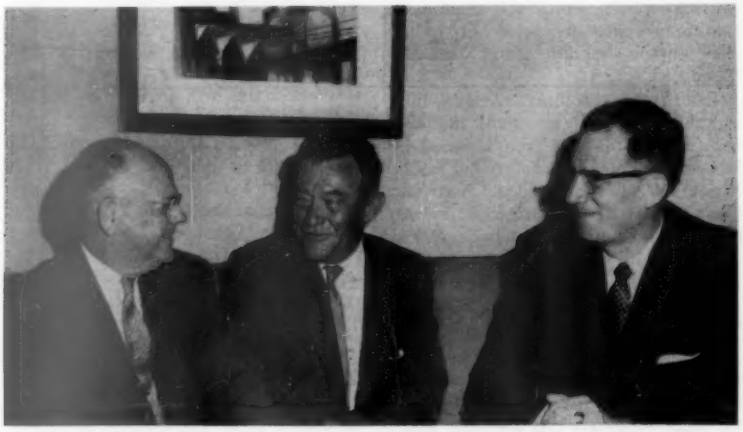
. . . J. J. Dunn manager of export sales in the company's marketing department at Houston. Dunn joined McCullough Tool Co. as a service engineer in 1947. Two-years later he began with United Oil Well Service Co. in Anaco, Venezuela, but returned to McCullough in 1951.

He left McCullough in 1955 to join Servicio Tecnico de Pozos in Anaco, Venezuela. He started with Johnston Testers last November as a sales engineer, and in February was named assistant to the northwest division manager in Denver.

Rockwell executives hold talks

. . . at a recent three-day marketing and product information-exchange conference. More than 30 persons from Rockwell Mfg. Co. met at the East Chicago plant of Edward Valves, Inc., a Rockwell subsidiary.

L. A. Dixon, Rockwell's executive vice president, gave the keynote speech. Paul C. Kreuch, sales vice president of the Meter & Valve Division, headed a team of company marketing experts, outlining major cus-



NEW HALLIBURTON DIRECTOR is H. C. Otis, center. His Otis Engineering Co. was absorbed by Halliburton Oil Well Cementing Co. through stock transfer, and Otis was elected a director of the parent company. Welcoming him are two Halliburton executives, Chairman Logan D. Campbell, left, and President L. B. Meaders.

tomer needs in industries served by Rockwell.

A study was made of facilities and talents available in the Edward manufacturing, research, and engineering organization. Heading a task force of Edward personnel was William F. Crawford, a Rockwell director and president of Edward Valves, Inc. and Republic Flow Meters Co., another Rockwell subsidiary.

Deer is named sales engineer

... for Clark Bros. Co. in the Texas-Oklahoma Panhandle area, announces George W. Probst, Clark vice president in charge of sales.

In his new post, Z. B. Deer, Jr., will be responsible for the sale of Clark engines, compressors, and gas turbines throughout the northern half of New Mexico, the Oklahoma and Texas Panhandles, and the Liberal, Kans., area. He formerly was chemical-division supervisor with Celanese Corp. Deer will headquarter in Pampa, Tex.

Geofisica Rogers, C. A. opens

... a new branch in Madrid, Spain, according to Sam D. Rogers, head of Rogers Geophysical Co. affiliates.

The new facility offers complete geophysical services for oil operators in Spain and its possessions under the managership of Lewis F. Judson.

Other Rogers offices, in addition to Houston, are maintained in Caracas, Venezuela; Mogadiscio, Somalia; Paris, and London.

POWER SLIPS designed specifically to run casing are now in service in Northern Alberta. The slips, the first designed primarily for this application, were built by Ben F. Kelley Co., Inc., Tulsa. The slips were purchased by Leidecker Tool Co., casing contractor, of Edmonton. The photo was taken during the running of 11,000 ft. of 7-in. casing on Rig No. 2 of Peter Bawden Drilling, Ltd. The well site is 53 miles north of White Court, Alta.

RECENTLY COMPLETED WAREHOUSE of Hugh J. Gransaull & Co., Ltd., is the first facility in Trinidad, B.W.I., for exclusive use as an oil-field supply store. Brown Oil Tools, Inc. recently appointed the company exclusive representative in Trinidad.

C. E. Mangold, W. N. Estel named

... assistant general managers of Dowell Division of The Dow Chemical Co. Both men will continue company-wide activities in cost control and personnel management, respectively, while assuming the added responsibility.

C. E. Mangold

W. N. Estel

Mangold will head Dowell's industrial department, including the company's missile program. He will also provide assistance to the Shreveport district, which serves the Arkansas-Louisiana-Texas area and the industrial region served from Dowell's Cleveland office.

Estel will continue his personnel function and will represent management in the oil-field area serviced by Dowell except Oklahoma, the Rocky Mountain region, the Gulf Coast, and Canada. Estel will work closely with district managers at Evansville, Wichita, Midland, Amarillo, and Wichita Falls.

Walworth promotes Younggren

... to assistant division manager of the company's Gulf division. A Walworth employe for 17 years, Joseph G. Younggren will aid Division Manager William M. Combs in the administration of the South-Central territory that embraces three states and parts of three others. The new assistant division manager will locate in Houston.

Baash-Ross Division is named

... domestic distributor for Derrick String-a-lite assemblies for masts and derricks. Manufacturing will continue to be done by Electrical Products Division of Joy Mfg. Co. in St. Louis. Baash-Ross is another Joy division. The new product will be available exclusively through oil-field supply stores.

K. J. Walker is appointed

... manager of South American Sales of Garrett Oil Tools, Division of U. S. Industries, Inc. He has served with Garrett since 1952, and has been manager of relief-valve sales the past 4 years.

K. J. Walker

In his new position, Walker will establish an office in Caracas, where responsibilities will include sales promotion in the South American market, and the training of agents and distributors in that area.

At the same time, Garrett announced the promotion of N. V. Fowler to manager of relief-valve sales in the United States and Canada. Fowler has served as relief-valve sales engineer with the company since 1957.

Oil Well Supply appoints five

... according to M. F. Jones, the division's Gulf Coast area manager. Lail Hamilton Shaw is the new assistant district engineer at Houston. He began with Oilwell in 1957 at Corpus Christi, Tex. Early last year

he was transferred to the division's Imperial Works at Oil City, Pa., and in June was appointed district engineer at Farmington, N. M. Most recently, he served in the same capacity at Fort Morgan, Colo.

Amos L. Savoy assumes the title of store manager at Eunice, La. A 5-year division employe, he was appointed field representative at Houston in 1955.

Oscar W. Mykleby takes over as field representative at Houma, La. He was appointed field representative at Houston in 1957, after starting with the division the previous year.

Joseph C. King, who goes to Laurel, Miss. as a field representative, was employed by Oilwell in 1956 at Lake Charles, La. King was transferred to Brookhaven, Miss. last year, and was located in Houston prior to his present transfer.

Woodrow Smith, new field representative at Brookhaven, was employed by the division at Houston 6 years ago. In 1957 he was transferred to Houma, La., and in 1958 to Brookhaven.

T. S. (Nick) Lancaster appointed

T. S. Lancaster

. . . Oklahoma City division sales representative for Western Co., announces C. E. Wooldridge, Oklahoma City division manager.

Lancaster has more than 25 years experience in service work throughout Oklahoma. He began working as an acidizing truck driver in Seminole in 1933, and has since held district and division manager positions in Seminole, Enid, Pauls Valley, and Oklahoma City.

Most recently Lancaster was regional sales representative for BJ Service in Oklahoma City. His service career to this time was spent with Chemical Process Co. and its successor, BJ Service, until his recent resignation to join Western.

Jack L. Ashby is named prexy

J. L. Ashby

. . . and chief executive of Kaiser Steel Corp. A company employe since 1942, Ashby has been vice president and general manager since 1948.

The new president's first position with Kaiser was expediter of materials and equipment during construction of the Fontana, Calif. plant. In 1943 he was named sales manager; in 1944, general sales manager; in 1947, vice president and assistant general manager; and in 1948, vice president and general manager.

Ohio Injector Co. separates

. . . its field-sales organization into two regional operations. Carl G. Link becomes eastern regional sales manager with offices in New York, and R. F. Dauenhauer is the new western regional sales manager, with headquarters in Chicago.

C. G. Link

R. F. Dauenhauer

Link joins O.I.C. from New York Belting & Packing Co., a U. S. Rubber Co. subsidiary, where he was national sales manager. Dauenhauer was promoted from sales manager of Central Division of O.I.C. at Chicago.

J. A. Snarenberger is assigned

J. A. Snarenberger

. . . as a sales engineer in the Kansas City territory, reports R. W. Bayerlein, vice president of Nordberg Mfg. Co.'s Engine Division.

In his new post, Snarenberger will assist J. T. Adams, Kansas City district manager, in municipal, industrial, and pipeline sales for Nordberg's two and four-cycle engines. He will headquarter in Wichita, and will cover Colorado, Kansas, western Missouri, and Nebraska.

The new Nordberg sales engineer has a background of 14 years in the diesel-engine field, and his experience includes marine-towboat design and repowering.

Regional sales managers named

. . . by Thompson-Ramo-Wooldridge Products Co., reports Raymond E. Jacobson, director of marketing. Rigdon Currie, southwestern regional sales manager, will establish offices in Houston.

Ray J. Stanish, newly named central regional sales manager, will set up offices in Chicago; and William O. Paine, who will head the western region, will locate in Los Angeles.

Dan Goodrich is elected prexy

Dan Goodrich

. . . of the North Texas (Dallas) chapter of the National Industrial Advertisers' Association for 1959-1960. Goodrich, a Dallas agency executive and a veteran of more than 20 years in the advertising business, has been with two national advertising agencies—McCann-Erickson, Inc., and McCarty Co.

In 1947 he formed his own agency, which handles only advertising of firms selling to the petroleum and chemical industries. A long-time member of the association, Goodrich has also held office as treasurer, secretary, and vice president in the Dallas chapter.

Richard M. Perdue, Texas Instruments, Inc., and R. A. Surrey, Johnston Printing Co., were elected vice presidents. New secretary is Gene Garner, Continental-Emsco Co. C. A. Nicholson, Chance Vought Aircraft, Inc., is treasurer, and Charles M. Clough, Texas Instruments, is sergeant-at-arms.

The outgoing president, W. J. Alexander, also of Continental-Emsco, was elected a national director.

John S. Kline is appointed

. . . general manager and chief executive of Carpenter Steel Co.'s Alloy Tube Division, Union, N. J., to succeed P. L. Coddington.

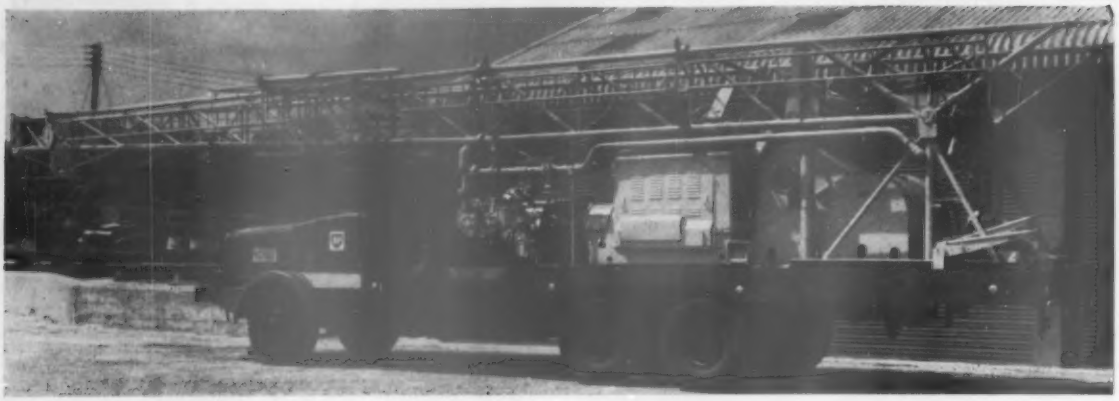
Kline has been assistant general manager of the division the past year. Prior to that he was divisional controller of both the Alloy Tube Division and Carpenter's Webb Wire Division in New Brunswick, N. J., for 6 years. He joined Carpenter as an auditor in the Reading, Pa. home office in 1945.

Before joining Carpenter, Kline was with Metropolitan Edison Co., Reading, Pa., for 8 years.

Maloney-Crawford forms

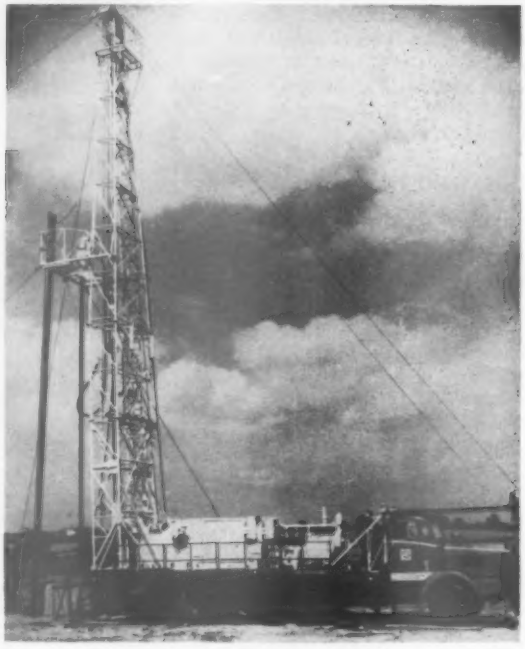
W. W. Wibel

. . . a new corrosive-engineering division, and names W. W. Wibel director, according to R. C. Schenk, president. Wibel comes to Maloney-Crawford Tank & Mfg. Co. with many years experience in the chemical-coatings industry. He was formerly sales manager of Chemical Marketing & Mfg. Corp. of Chicago.



Ready to travel ↑ . . . and ready for business ↓

British mobile rig will drill in Libya



THE FIRST MODEL of a newly designed mobile rig has been built for British Petroleum Co.'s exploration program in Libya.

The outfit has greater capacity and mobility than any other rig of all-British design. The unit is the brainchild of BP engineers and Piling & Construction Co. Ltd. Croydon, Surrey, England.

The rig is mounted on a Thorneycroft "Big Ben" truck, and is powered by twin Dorman 96-b.hp. diesel engines through the main gear box. A tubular steel mast, raised or lowered by hydraulic rams, gives 58-ft. clearance above the rotary table. It has a capacity of 60,000 lb.

Double-drum draw works are operated through Air Flex clutches and designed for a hook load of 35,000 lb. off the main drum. The rotary table has an 18-in. opening. The mud pump is an Ideal D.50 5 by 10-in. duplex. Main controls are operated by compressed air. Static capacity of the rotary swivel is 40,000 lb.

Called the "Pilcon 2500," the rig is rated at 2,500 ft. using 2⅞-in. drill pipe, and at 4,000 ft. using 2⅜-in. pipe.

Camdrill gets more contracts for Libya drilling

Camdrill International, Inc., has obtained its sixth and seventh drilling contracts with subsidiaries of American companies operating in Libya. Camdrill, a subsidiary of Southern California Petroleum Corp., is doing business in the country in a joint venture in which it has two-thirds interest.

In one of the new contracts, Camdrill will furnish personnel to operate a company-owned rig. In the second case, it will supply both a crew and a Desert Star type rig, camp, and related equipment.

TOCK opens Wichita office

TOCK, a new cable-tool drilling company, has opened a field office in Meade, Kans., and will headquarter in Wichita. The firm whose name is derived from the four states in which it will operate was formed by Wade A. Gates of Meade, and H. D. Shreve, Wichita. Areas of operations include: western Kansas, southeastern Colorado, and the panhandles of Texas and Oklahoma.

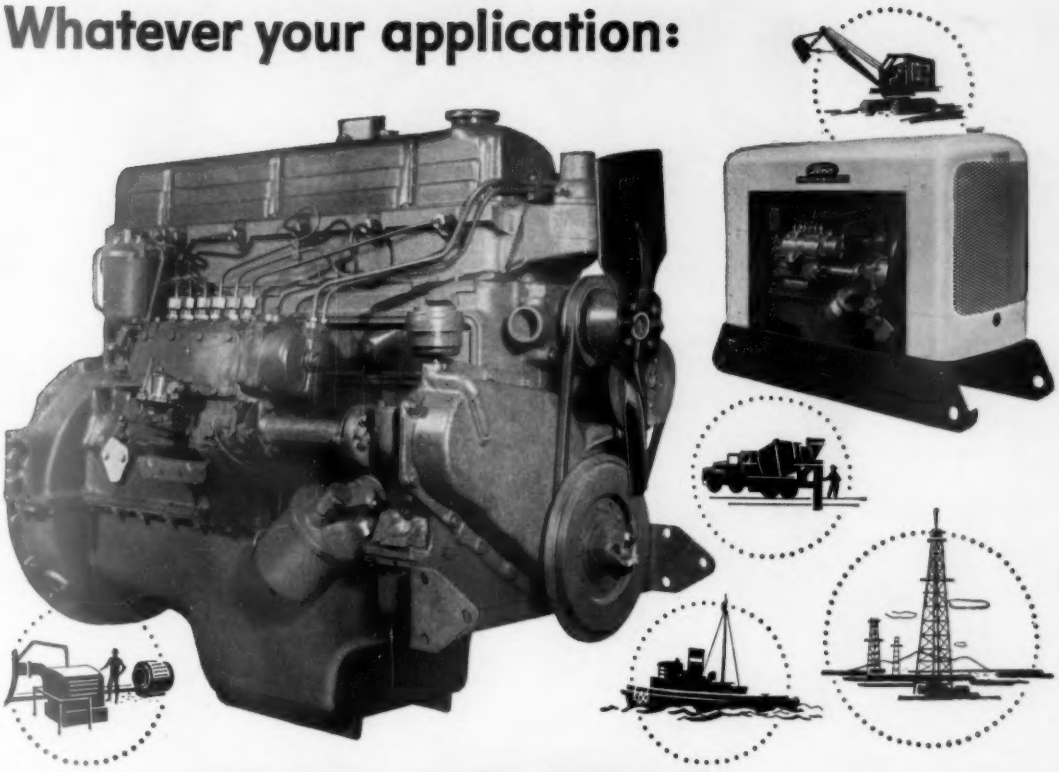
Shreve will work from Wichita and Gates will head the Meade office. Gates formerly was production superintendent for Graham-Michaelis Drilling Co.

New rig product

A. A. King, Ltd., a Calgary-based manufacturers' representative, reports the addition of a new product in his sales line. It is R-W rig-wash compound, manufactured by Procter & Gamble. Extensive field tests have been conducted and some drilling contractors are using R-W exclusively.

The recently developed heavy-duty detergent has features which include fast-cutting action on oil and grease but safe for use on paint and on hands. It has an excellent performance under all water conditions, whether hard, soft, or cold. It has a low-density, thereby cutting costs for use.

Whatever your application:



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Simple in design and modern throughout, both Diesels offer heavy-duty 12-volt ignition systems for fast all-weather starting . . . overhead-valve construction for higher engine compression, more power . . . and four-way fuel injectors for efficient combustion, greater operating economy.

Quality-built by the most modern production methods, these Diesels are also low in initial cost. And because prompt Ford service is available almost everywhere, Ford Diesel users can count on a minimum amount of downtime.

For these reasons and more, a Ford Diesel can cut your operating costs . . . handle a greater work load. Therefore, specify Ford Diesels for original installation or for engine replacements. Write for details today.

ENGINE SPECIFICATIONS		220	330
Basic Model		X	Y
Number of Cylinders		Four	Six
Bore and Stroke—Inches		3.94 x 4.52	3.90 x 4.52
Displacement—Cubic Inches		220	330
Brake Horsepower	Dynamometer	60 @ 2250	96 @ 2250
	Continuous	48 @ 2250	77 @ 2250
Torque	Dynamometer	151#' @ 1600	236#' @ 1600
	Continuous	121#' @ 1600	189#' @ 1600
Compression Ratio		16 to 1	16 to 1

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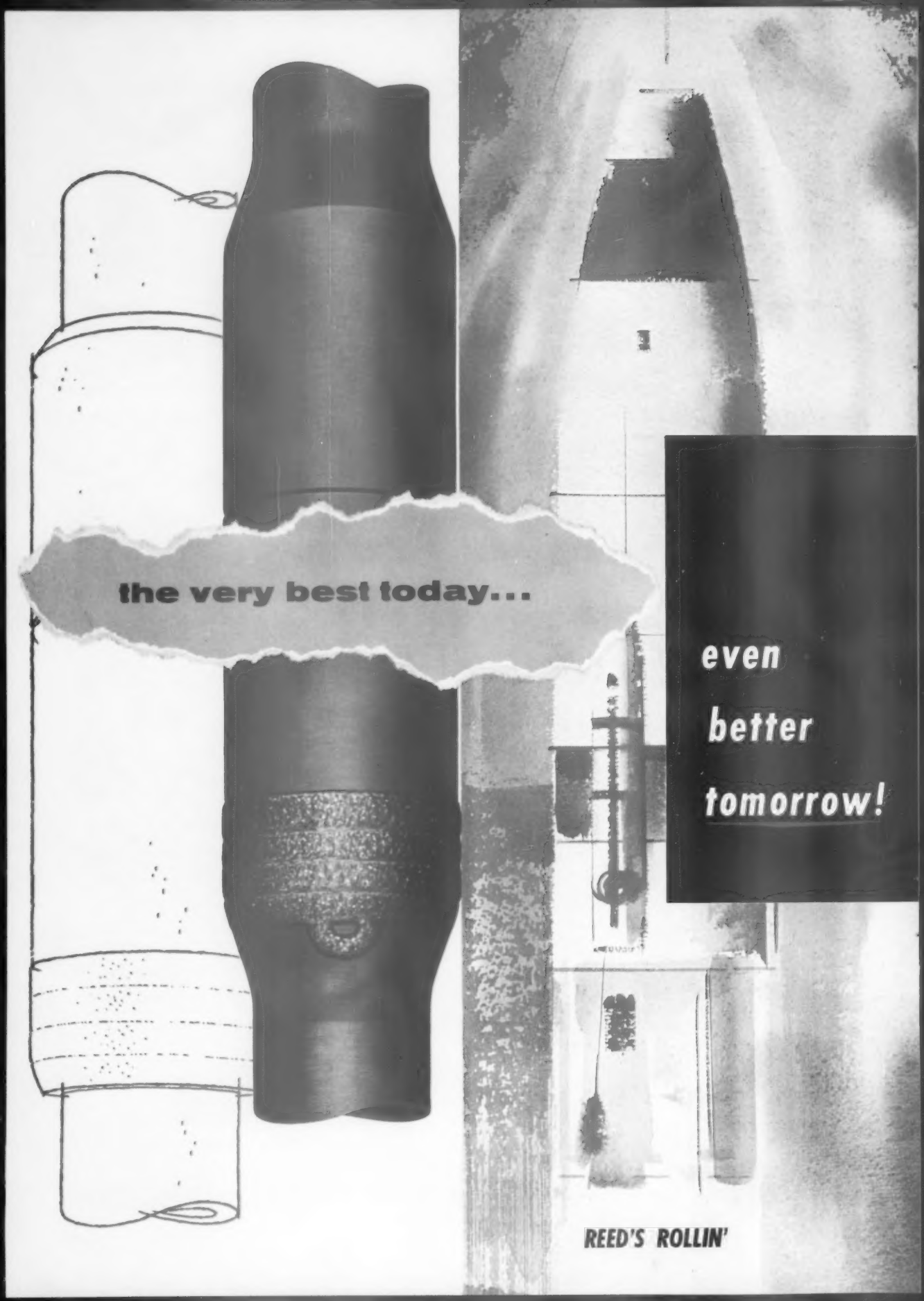
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For twenty-five years Reed has pioneered advancements in tool joint design—the Shrink-Grip joint which practically eliminated last engaged thread failures—the Internal Flush joint that became API Standard—the Double Streamline joint (the 4½" size later adapted as API Standard 4" Full Hole)—the Semi-Internal Flush joint (later called Extra Hole)—the Super Shrink-Grip joint with cylindrical land and fixed landing shoulder for foolproof field application and removal—the Wide-Open joint for light weight drill pipe—the "tensile impact" test for flash welds (there has never been a field failure in the weld area of a Reed Flash Welded tool joint).

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When you buy your next string, remember this—Reed Tool Joints will outlast any others!

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TOOL JOINTS

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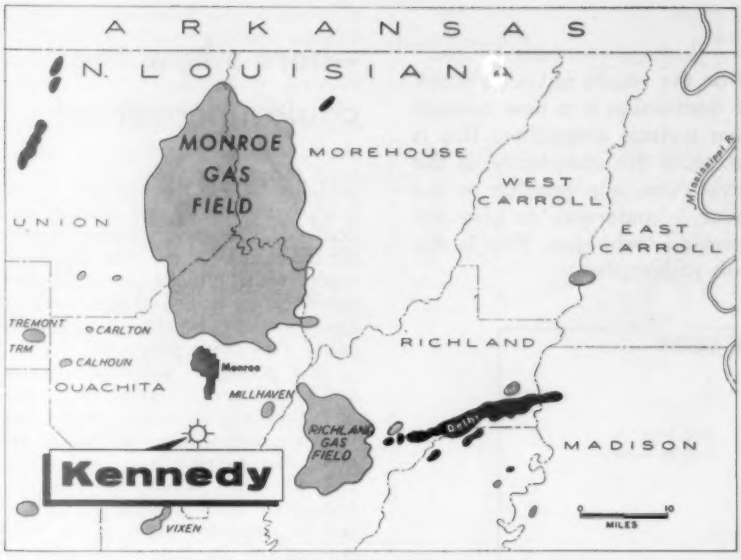
Houston 1, Texas

EXPORT OFFICE: 1011 INTERNATIONAL BLDG., NEW YORK 20, N. Y.

GULF COAST, MID-CONTINENT, ROCKY MOUNTAIN AND CANADIAN DISTRIBUTOR FOR MARTIN DECKER PRODUCTS.

Melzo, Italy. Time to start work for Renato Raggi, owner of a BP Petrol Station. By the end of this year – BP's first year in Italy – some 1500 BP stations will be in operation along Italian roads.

BP



A FIVE-PAY GAS DISCOVERY on the Kennedy prospect in southern Ouachita Parish should stimulate more wildcat drilling in North Louisiana's eastern parishes. All five sands discovered so far lie within the Lower Cretaceous section, but the Jurassic is expected to add to the list before total depth of 10,300 ft. is reached.

North Louisiana strike adds four pays

BY FRANK J. GARDNER

NORTH LOUISIANA has come up with one of the most interesting discoveries in that area for a long time. It's a five-pay strike in the Lower Cretaceous section, and it's still a few hundred feet short of its goal in the Jurassic-Cotton Valley.

Arkansas Louisiana Gas Co. 1 S. D. Kennedy, Section 2-16n-3e, Ouachita Parish, was spudded on April 27; it made news a month later when a drill-stem test of Causey-Basal Trinity sand flowed 2,800 M.c.f. gas per day on ¼-in. choke, with 1,910-psi. pressure. The productive depth then was 5,678-87 ft. At the time, Arkansas Louisiana Gas referred to it as "a major discovery."

A lot of pay sand . . . But now, the operator has five times as much basis for the "major" label on this well. On a series of drill-stem tests of the Hosston formation, four more commercial pay zones, all gas, have turned up. Three are in the upper Hosston at 6,130-6,650 ft., one in the lower at 8,500 ft.

Target depth of the well is 10,300 ft. to test the lower Cotton Valley-Jurassic section. As this is written, it has only 500 ft. to go. Pipe was set to 9,360 ft.

On a test at 6,138-50 ft., the 1 Kennedy showed commercial gas at a rate of 2,500 M.c.f. per day on ¼-in. choke; flowing pressure was 1,750 psi. A second test, this time at 6,445-56 ft., had a flow of 100 M.c.f. daily, also on ¼-in. choke, no pressure reported. At 6,636-50 ft., gas flowed at 900 M.c.f. per day on ¼-in., with 680-psi. pressure. Finally, in lower Hosston at 8,487-8,500 ft., flow was 470 M.c.f. on ¼-in. choke, pressure 345 psi.

May mean a repetition . . . This significant discovery lies 4 miles southwest of Monroe, La., and 10 miles south of the big Monroe gas field. It is a 100% Arkansas Louisiana operation, and the company holds about 3,700 acres on and around the Kennedy prospect. Other companies with acreage in the immediate vicinity are Carter Oil Co. and Pan American Petroleum Co.

Arkansas Louisiana is hopeful that it may have uncorked another major gas field here. It has been very active in this area over the past few years, and was responsible for development of Calhoun gas field, 15 miles northwest of the Kennedy find. Here, the operator has uncovered 19 separate gas and condensate zones in the Lower Cretaceous-Jurassic section with the drilling of 10 wells. The unusual success at Kennedy's one wildcat points to a repeat performance there.

In an old region . . . This discovery is just one more illustration of the good hunting still to be had in "old" oil country. North Louisiana continues to attract the independent wildcatter with its multiple-pay, fairly shallow prospects; these, combined with reasonable exploration and drilling costs, plus good per acre reserves, encourage the "little man" to try his hand there.

Activity this year is a little ahead of 1958, and discovery success is about the same. Some areas are extremely busy. For instance, the old Caddo-Pine Island field in Caddo Parish (a 1906 discovery) lists page after page of new locations in current weekly scout reports. This is a result of success with fracturing in the shallow Cretaceous chalks at 1,300-1,400 ft.

But deep drilling is on the upswing also. Significantly, during the first half of 1958, the average North Louisiana wildcat went to 5,675 ft.; this year, it goes to 6,046 ft. for an increase of 371 ft. Most of the deep wildcats are seeking Jurassic-Cotton Valley and Smackover reservoirs at depths ranging from 8,000 to 10,000 ft.

In this respect, the Arkansas Louisiana 1 Kennedy is typical. It lies within the Cotton Valley "fairway" that stretches in a convex arc from the Sabine uplift on the west to the Richland uplift on the east.

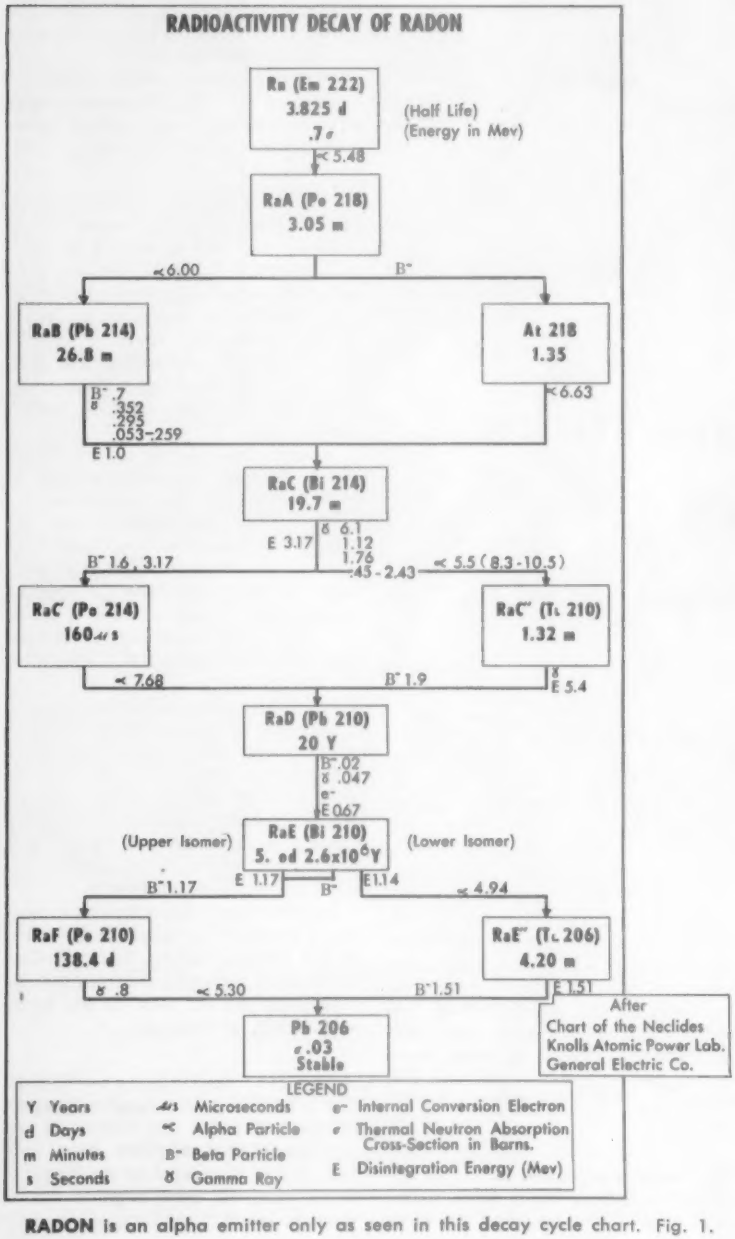
With lots of blank spots . . . With its five potential pays and the prospect of more to come, the wildcat is **not** so typical. Few operators have such luck. But it does point up the fact that blank spots still loom large on the oil map of North Louisiana.

BY WILLIAM D. CREWS
Petroleum Consultant and President,
Exploration Unlimited, Inc., Tulsa

Radioactivity surveys

—here's how they could uncover oil

This article is a hypothesis based on the results of an objective research program. The proposed mechanism is a new concept for the explanation of radioactive surface anomalies. This is also the first public attempt to explain the complexity of the radiation phenomena and to draw some appreciation to the fact that a true scientific endeavor is underway to give the industry a creditable new exploration technique. This is the second of a three-paper series on radioactivity.



RADON is an alpha emitter only as seen in this decay cycle chart. Fig. 1.

RADIOACTIVITY surveys, when properly interpreted and basically understood, offer great potential in aiding the search for oil. The technique holds much promise as a reliable semidirect method of oil detection and can materially benefit existing integrated exploration programs.

Most previously published theories and hypotheses concerning the causes of radioactivity surface anomalies and their association with oil deposits require that hydrocarbons, gas, water and radioactive particles be physically transported from depth to the surface and be deposited there where their radioactivity (or lack of it) may be measured.

There have been many speculations as to the mechanisms involved in achieving this result such as:

- Increased solubility of radium salts in ground water by the presence of hydrocarbons.[1]
- Normal migration and deposition of chlorides by ground water as affected by oil accumulations.[2 3]
- Variations in radon concentration at the surface due to increased absorption by the oil at depth.[4 5 6 7]
- Deposition of radioactive particles from ground water (general geochemical phenomenon).[8 9]
- Close association of petroleum and uranium.[4]
- Seepage of hydrocarbons to the surface, carrying with it heavy element, butene-type complexes (free radical mechanisms) which are decomposed and deposited at the surface.[10]
- Some claim that radioactivity at the surface is not even associated with oil, only with the topsoil.[11]

Review of Older Concepts

There are many phases of these proposed theories that current work, both laboratory and field, contradicts. These findings indicate that radioactivity anomalies associated with oil accumulations are not caused by any variation in texture, composition, or depth of the topsoil. This, therefore, raises doubts about the preceding hypotheses with the exception of variations in surface radon concentration.

This holds because of the requirement that radioactive particles be deposited and accumulated in the sur-

face mantle. Objections to the radon proposal are:

1. It has been found that radioactivity surveys accurately define the limits of production. For example, in a South Texas survey, where the first production is encountered at about 8,000 ft., the radioactivity anomaly at the surface corresponds within about 100 ft. to the proven oil-field limits. If the migration path of the radon from this depth varied more than 1° from the vertical, the resulting anomaly would be displaced or distorted by a distance greater than 140 ft.

2. When the radon reaches the surface, its composition should vary from adsorbed "soil gas" to a component of the air above the soil. Regardless of where it occurs, radon would be subject to all the atmospheric forces —wind, temperature, pressure, and humidity. The effect of these forces is variable over relatively short distances, thus upsetting any tendency toward establishment of equilibrium.

This means that a reliable survey could be run only under constant and ideal weather conditions and that a repetition of results would be virtually impossible.

It is true that background at a given point will vary with atmospheric changes, but the variation is relatively small compared to the magnitude of the anomalies which are associated with oil. Therefore, by taking a continuous time-radioactivity reference, these atmospheric variations may be negated on the basis of survey data over that period. With this technique, repeat surveys and tie-ins to old survey lines have been made successfully after several months lapsed time and under different weather conditions.

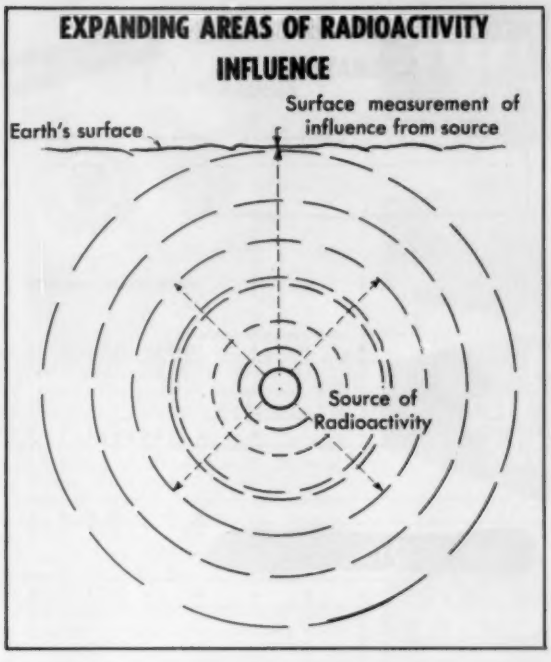
3. In running radioactivity surveys, only gamma radiation is measured. However, radon is an alpha emitter only. As shown in the decay cycle of radon (Fig. 1) there are only five gamma emitters and most of these are where the chain branches.

Part of the gammas result in positron-electron pairs, the reverse of positron-electron annihilations rendering a portion of the original radiant energy from radon decay undetectable.[12] In addition, all the daughter elements of radon are chemically active and tend to return by association to their native solid state.

Direct measurements of radon anomalies would have to be from radon decay elements deposited in the topsoil. This is apparently precluded by current research.

A New Hypothesis

Radioactive materials are located at depth within the earth. At this point in the discussion, it is not necessary to define an exact source or location of this radioactivity. It is sufficient to state that the source is below the oil accumulations, and whether it is a point-type source near the earth's center or merely the dispersed radioactive materials which occur throughout the earth's crust, is not of immediate importance. The radiations emanating from these materials are completely random with respect to time and direction.


EXPANDING AREAS OF RADIOACTIVITY INFLUENCE
Surface measurement of influence from source
Earth's surface
Source of Radioactivity

SURFACE POINT of greatest reading is the vertical component of radioactive influence as it moves out from source in concentric circles. Fig. 2.

Dispersed throughout the earth's crust are materials which may be made radioactive by inducement (primarily gamma ray bombardment), in turn emitting radioactive emanations. The location of these materials is random. Therefore, statistical reasoning may be applied to a discussion of the probabilities of this mechanism.

This process of radioactivity inducement by gamma rays and the subsequent reemission of neutrons and gamma rays is common and is described as photodisintegration.[12,13] The gamma-ray emissions (some of which may be soft gammas) resulting from this photodisintegration can originate in both the nucleus and the planetary electron structure of the excited atoms.

From the source material, a series of radioactivity inducements and reemissions are set up in all directions. As the radioactivity influence from a given point (or area) moves out in concentric circles (Fig. 2), the point at the surface where the greatest effect will be measured is the vertical reflection of the source.

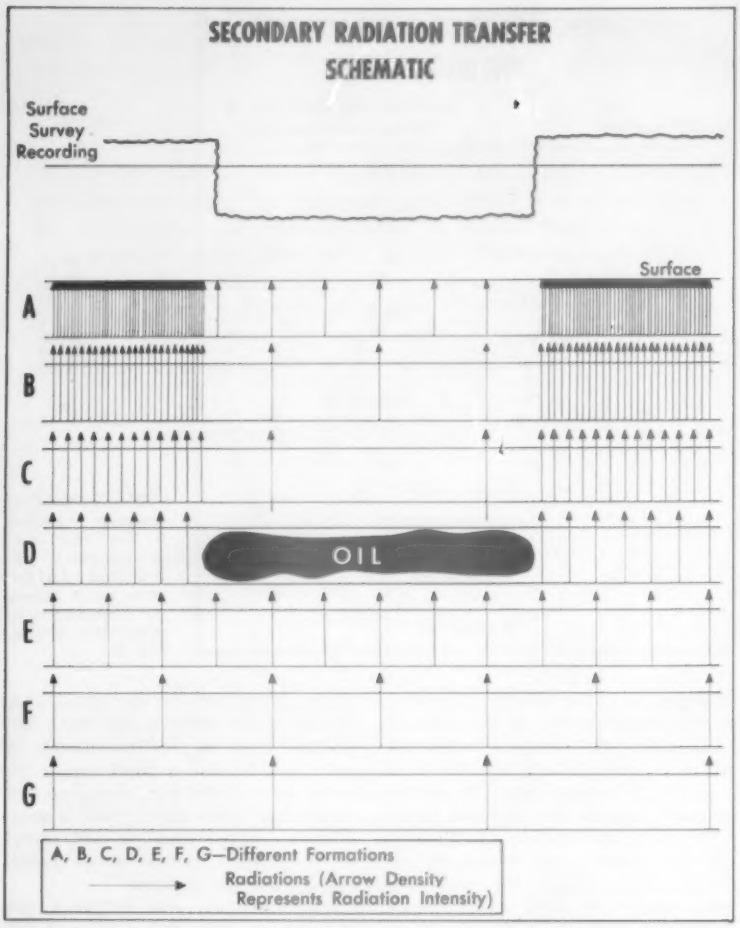
Though the total influence from a given source will be measured over an arc at the surface, the most significant level of radioactivity at a point will be due a point source directly below, and the averaging and integrating which takes place in scintillation gamma counting will reveal anomaly limits directly above radioactivity changes at depth.

Therefore, for our purposes, we will consider only that portion of this series of secondary radiations which moves vertically toward the earth's surface. The mechanics of this process may be analogous to diffusion and Brownian movement.

From below an oil accumulation at a given point in time, a "bank" of radioactivity of relatively even intensity moves toward the surface of the earth. (For this bank, the radioactivity is considered as originating from sources dispersed both horizontally and vertically in the earth's crust, but similar reasoning would be valid for an assumption of a point source for the total original radiation.)

In this continuing reaction the total energy of all the radiations involved will diminish; but due to contact with ever-increasing numbers of susceptible (to induced radiation and reemission) particles and some naturally radioactive particles, the intensity (intensity herein defined as the total number of detectable gamma radiations and not total energy) of the bank increases as it approaches the earth (see Fig. 3).

This expanding bank of radioactivity is affected by the relative concentrations of susceptibles (O, Si, Al, Fe, Na, K, Ca, Mg, etc.) and the



RADIATION BANK loses most of its energy as it passes through a continuous oil accumulation, regardless of thickness. Fig. 3.

ordered location of these concentrations as influenced by the factors controlling the accumulation of oil.

Crude petroleum is known[14] to act as a protective agent against gamma irradiation. This action is more than shielding and is probably the result of commonly accepted mechanisms[15 16] in which the petroleum scavenges free radicals formed by the irradiation or provides an effective medium for internal energy transfer.

Compared to water, rocks, minerals, etc., the activation energy required by hydrocarbons is very low (order of 10^{-2} K-Cal/Mol) thereby making it easier to dissipate radiation energy. This dissipation need not be through reactions resulting in changes in the crude oil, but may be through energy emission over various portions of the spectra, e.g., infra-red (heat).

Therefore, (Fig. 3) as this radiation bank reaches an oil accumulation, the portion of the bank entering the zone of continuous oil saturation, regardless of thickness, loses most of its energy. As the bank moves upward past the oil accumulation, a new bank begins to form above the oil by the same mechanism that initiated the original bank, the areal extent of which assumes the shape of the oil reservoir. From this point on to the surface, the entire bank, both new and old, will increase its intensity at the same rate.

The net result for surface measurement of the radioactivity is that the gamma-ray intensity over the oil field will be lower by an amount equal to the energy lost in traversing the petroleum accumulation. Undoubtedly some neutrons would be detectable at the surface, but due to their low intensity, the statistical requirements for reliable counting render the field application unfavorable at this time. It is known that measureable beta anomalies (which could be an indirect measure of neutron activity) exist on the earth's surface, but insufficient data has been gathered to permit any correlation with oil occurrence.

It is probable that this mechanism is the controlling factor in the production of a radioactivity anomaly, however, there are others which undoubtedly lend their influence in varying degrees, such as:

1. The sand-shale ratio at the edges of an oil reservoir is usually lower than that at the center of the reservoir. Since shale is usually more radioactive and contains a greater concentration of susceptible materials than sand, this situation would tend to increase the measured intensities around the oil field by amounts greater than that indicated in the basic proposed mechanism.

2. It has been generally found that the surface radioactivity pattern found over stratigraphically trapped oil corresponds well with the schematic representation in Fig. 3. However, in areas where major faulting provides the trap, a high peak or halo of radioactivity is found at the edges of the oil accumulation. Usually the peak is more pronounced on the fault side of the reservoir than elsewhere.

Possibly there has been groundwater travel through the fault plane with consequent deposition of susceptible materials in the fault zone. This water movement need not necessarily precede the oil accumulation.

Drag may accompany the faulting with the result that an efficient oil trap exists in spite of a permeable fault zone. This increased concentration would reinforce the migrating radiations and result in a localized radioactive high on the surface.

Halo effect . . . There are several possible explanations for the halo at the oil-water contacts. In some cases, these may also account for part of the fault zone halo. A few of these, all of which result in increased susceptible material at or near the interface, are listed below:

- A mechanism similar to secondary enrichment of ore deposits[17] may concentrate susceptible mineral-type components from the rock at the oil-water interface.
- If, as has been proposed[1] the presence of hydrocarbons increases the water solubility of radium salts, the reservoir volume may become leached of these salts by partition coefficients and gravity with a subsequent deposition of them outside the oil phase.
- If heavy mineral complexes are formed with the unsaturated components of the crude,[10] resulting in a partition coefficient in favor of the water, the reservoir content of heavy metal susceptibles may be displaced from the oil phase and deposited at the periphery.

Resume . . . When the new hypothesis

is compared with the older concepts, it becomes evident that there is really no conflict, but rather that the old and the new are complementary. The result is that, with a slight change in perspective, there is possibly a better understanding of the causes and mechanisms of petroleum-associated radioactivity anomalies at the earth's surface. Still further research is required to more completely understand and exploit these mechanisms.

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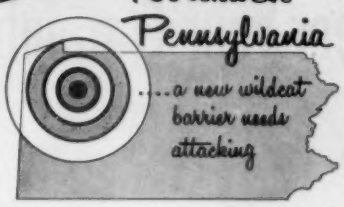

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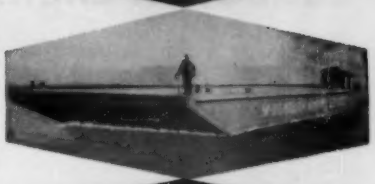

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Here are examples of the type of results that are being

In the Texas and Oklahoma Panhandles —

—16 treatments were engineered with the "Frac Guide." These treatments produced production increases that averaged 63 per cent better than those obtained by previous treatments on similar wells. In many wells, treatment costs with the "Frac Guide" averaged 20 to 30 per cent less than costs on previous treatments. The improved production increases meant faster payouts and more profitable wells.

In the Denver Julesburg Basin —

—treatments engineered with the "Frac Guide" have been used in both the "D" and "J" sands. Generally, payout time on these jobs has been about half that of previous treatments because the desired amount of sand can be put away with less refined oil. For example, two treatments into the "J" sand were compared. Payout time for the job using the "Frac Guide" was only 100 days as compared to 186 days for the other job. In another study of two treatments, the cost of the job using the "Frac Guide" was about $2000 less, and payout time was more than 50 per cent less.

In Northern Oklahoma —

—40 wells treated with the "Frac Guide" were compared with other fractured wells. The jobs using the "Frac Guide" cost about 15 per cent more but allowed the use of 50 per cent more sand. Initial potentials of the wells treated with the "Frac Guide" were higher, and decline curves are expected to be flatter.

In Southern Oklahoma —

—the "Frac Guide" has permitted the use of water-base fluids instead of more expensive fracturing fluids. Many wells have been treated with four-cent-per-gallon fluids instead of the 10-cent-per-gallon fluids previously used. Many excellent producers have resulted.

In Lea County, New Mexico —

—Lea County wells treated with and without the "Frac Guide" were compared. The wells for which treatments were engineered with the "Frac Guide" averaged 295 bopd flowing, while other fractured wells averaged less than 70 bopd pumping.

Early dawn in the Four Corners area finds operators and Dowell ready to go. Dowell fracturing treatments in formations like the Gallup have been particularly successful.

obtained with the help of "Frac Guide" developed by Dowell

In Crane County, West Texas –

—wells completed in the San Andres have shown much slower decline rates after treatments with the "Frac Guide," even though there were no significant increases in potential.

In Ector County, West Texas –

—a comparison of wells in the Edwards pool was made. Treatments engineered with the "Frac Guide" gave production increases about 40 per cent greater than other treatments in the same field.

In the East Texas-Northern Louisiana area –

—comparisons were made on a control group of eight wells—four wells were treated with the "Frac Guide," and four without. All wells were completed into the Mooringsport formation and were generally similar. Treatment costs for the wells fractured without the "Frac Guide" averaged $4440; and average production test figures rose from 6.5 to 55.5 bopd. When the "Frac Guide" was used, treatment costs dropped to an average of $2904. Average production test figures rose from 8 to 121 bopd. In this case, an average of $1536 was saved per treatment, and results were greatly improved.

In Uintah County, Utah –

—a well was producing 10 bopd and failed to respond to a fracturing treatment. Another similar well was treated with the aid of the "Frac Guide." This well was also producing 10 bopd before treatment. After fracturing, production shot up to 220 bopd; and the well was still producing 185 bopd—steady—60 days later.

In Converse County, Wyoming –

—two treatments made with the "Frac Guide" were compared with other frac jobs made on the same lease. Previously, rapid production declines to 12 or 15 bopd had made frequent re-treatments necessary. All wells in the field had been pumping. Though the jobs with "Frac Guide" cost about twice as much, production stabilized at about 56 bopd *flowing*, lifting costs were reduced and payout was faster.

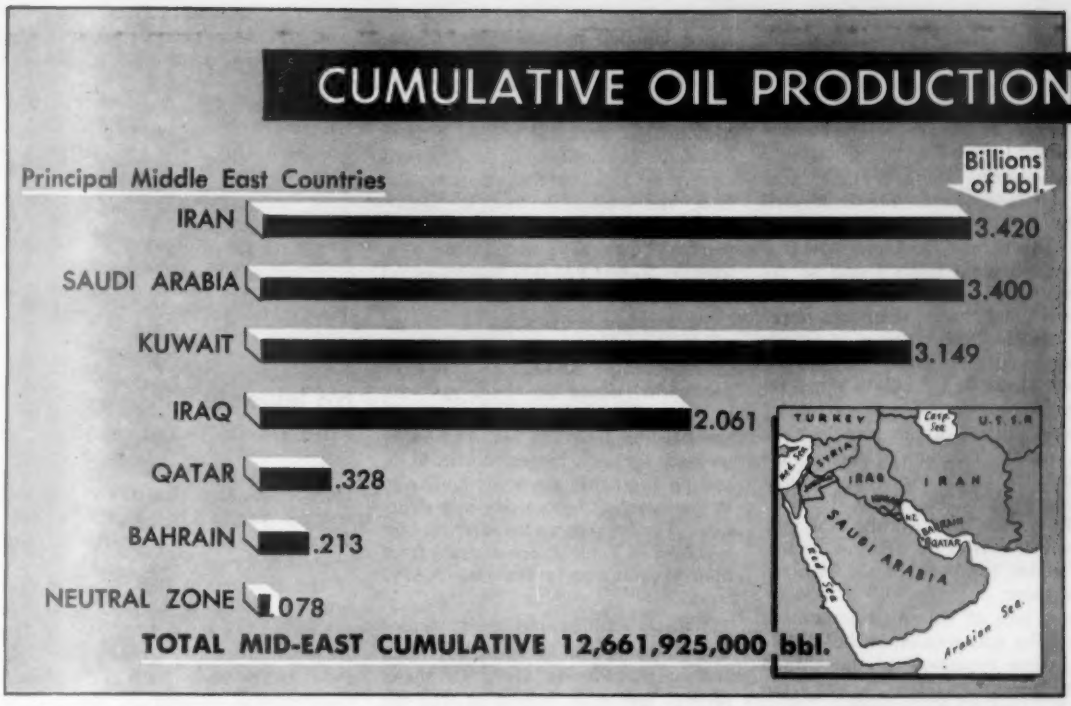
EXPLORATION ACTIVITY and results in Middle East countries during 1958 are graphically portrayed on this map. Wildcat drilling was widely scattered, and resulted in the discovery of four new oil fields and one gas field. In addition, two important 1957 discoveries reached final completion during the year. Shaded areas are the sedimentary basins.

Oil gets new center of gravity

LAST WEEK, this section of the Journal made reference to "the complete shift in oil's center of gravity from west to east." The map and chart on these pages tell graphically the story of where that center lies today.

Until the end of World War II, the United States was the greatest producer of oil and had the largest proved reserves in the world. American know-

Here's a capsule rundown of how oil's center of gravity has been steadily shifting from Texas to the Middle East over the past quarter century. Amazingly, this shift has been brought about by the drilling of only about 1,600 wells.



IRAN LEADS all Middle East countries in cumulative production; its total as of the first of 1959 was 3.42 billion barrels. Saudi Arabia is close behind with 3.40 billion barrels, and Kuwait with 3.15 billion.

how and enterprise had built up an oil industry that was the envy of the world. With the exception of Venezuela, Indonesia, and Romania, few countries offered the United States any competition.

In the 1930's the picture slowly began to change. And since the war it has completely reversed itself. Ironically, the change has come about largely because of that same American know-how and enterprise.

The first discoveries in the Middle East gave little inkling of what was to come. Oil was found in Iran's Masjid-i-Sulaiman field in 1908, but the field was not put on production until 1911, and no more fields were found there until 1923. Iraq's first fields were discovered at Kirkuk and Qaiyarah in 1927. In 1938, what was to become the world's largest single field was found at Burghan in the little shaikdom of Kuwait; today, this tiny land has about twice the proved reserves of the United States! Saudi Arabia entered the picture also in 1938, with the discovery of Damman field, and in 1940 Qatar joined the parade with its great Dukhan field.

After the war, British and American oil interests moved into these Middle Eastern lands in force. And they've

TABLE 1

MIDDLE EAST OIL RESERVES

Country	Proved reserves (1,000 bbl.)	% of world reserves
Bahrain	230,000	0.08
India and Pakistan	520,000	0.19
Iran	33,000,000	11.97
Iraq	25,000,000	9.07
Israel	50,000	0.02
Kuwait	60,000,000	21.76
Neutral zone	6,000,000	2.17
Qatar	2,500,000	0.91
Saudi Arabia	47,000,000	17.05
Syria	1,000	0.0004
Turkey	70,000	0.03
Total	174,371,000	63.25

TABLE 2—EXPLORATION ACTIVITY IN THE MIDDLE EAST IN 1958

Country—	Party-months: Geological survey	Seismic	Gravity	Magnetic	Core drill	Other
Aden	7.5	...	20.0	...	...	§
Cyprus	...	...	...	...	...	§
Dhofar	12.0	15.0	5.0	...	...	...
India	112.0	70.0	*54.0	...	...	...
Iran	42.0	53.0	25.0	...	...	†14.0
Iraq	18.5	66.0	7.0	7.0	...	§
Israel	...	19.5	...	...	‡4	...
Jordan	2.0	...	...	...	...	...
Kuwait	...	5.5	...	...	...	...
Oman	1.5	25.0	19.0	19.0	...	§
Pakistan, West	38.0	48.0	28.0	...	...	§
Pakistan, East	2.0	34.0	3.0	...	...	...
Qatar	...	12.0	...	...	...	...
Saudi Arabia	...	‡4	...	...	‡4	...
Syria	...	‡2	...	...	...	...
Trucial Coast	4.0	1.0	2.0	...	...	§
Turkey (Asian)	125.5	88.5	26.0	9.0	...	...

*Includes magnetic. †Topographic. ‡Number of parties only; months not available. §Photographic survey work.

found the greatest oil fields in history. The desert sands of Iraq, Iran, and Saudi Arabia, and the smaller countries of Qatar, Bahrain, and Kuwait now are known to overlie 63% of the world's oil reserve (Table 1)—at least 174 billion barrels.

The amazing thing is that these great oil fields have been uncovered by the drilling of only about 1,600 wells. This means the average reserve of the individual fields found so far exceeds 4 billion barrels! By contrast, in the United States, there are fewer than 25 fields with reserves of a half-billion barrels or more; the largest, in East Texas, is a 5-billion-barrel reserve.

The countries of the Middle East, then, are the fulcrum of the world's oil industry today. And they're in a delicate balance. This oil is the chief supply source for Europe and the Eastern Hemisphere, and an important source for parts of the Western Hemisphere.

Some idea of the small amount of wildcatting that goes on in the Middle East, when compared to the United States, for example, may be had from a study of the figures superimposed on the map. Only 50 new wildcats were sunk in 1958, according to a report just issued by the American Association of Petroleum Geologists*; in the United States, about 1,000 wildcats are finished every month. Yet, with its small number of producing wells, the Middle East poured out 4,272,884 bbl. per day last year, for a total yearly output of 1,559,533,000 bbl. In the same year, the United States, with about 600,000 producing wells, produced 2,447,548,000 bbl. for an average of 11.7 bbl. per well.

Of the productive countries in the Middle East, Iran has produced more oil than any other. It is followed closely by Saudi Arabia, Kuwait, and Iraq, and trailed in turn by Qatar, Bahrain, and the Neutral Zone. Altogether, they have accounted for a total of 12,661,925,000 barrels of oil (see chart).

Exploration activity in advance of the drill continues at an active pace throughout the Middle East. Surface geological parties are hard at work in 11 countries. Geophysical crews are blasting away in 14. And other methods (gravity, magnetic, core drill, and photography) are being employed in the search for promising new structures. The breakdown by party-months is shown in Table 2, constructed from figures contained in the new AAPG report.

Wildcat drilling last year yielded new oil discoveries in Turkey, Kuwait, and in the Persian Gulf. Of these, perhaps the most important was the Abu Dhabi strike in the Persian Gulf; this well, the first in the Abu Dhabi marine concession, was drilled on the Umm Shaif seismic structure 20 miles east of Das Island; for a limited time, it flowed 2,400 bbl. daily from Lower Cretaceous limestones. In northern Kuwait, the 1 Sabriya was successfully completed as a new discovery. Two 1957 Saudi Arabian discoveries were completed in 1958, one at Manifa offshore, the other at Khurais, a Jurassic Arab-D field about 70 miles due west of the great Chawar field.

*AAPG Bulletin, Vol. 43, No. 7; "Petroleum Developments in the Middle East, by Henry Hotchkiss, Standard Oil Co. (N. J.), pp. 1676-1713.

It's No. 13 for Ellis County, Oklahoma

Ellis County in northwestern Oklahoma gained its thirteenth producing area with the completion of Pan American Petroleum Corp.'s 1 Phillips in C SW NE 15-24n-24w.

Open-flow tests were made in both the Tonkawa Pennsylvanian and the Morrow Pennsylvanian. The Tonkawa gave up 3,650 M.c.f.d. from perforations at 5,835-39 ft.; The Morrow got 16,000 M.c.f.d. at 7,654-57 ft.

This far-northwestern county in Oklahoma has been the scene of a spirited gas search in the past 2½ years. Production was opened in the county at Salon several years ago, but the field soon joined the dry ranks. Several years went by before the Catesby and other field discoveries of the past 2½ years stirred operators in the potential of this county. Most production is from Pennsylvanian Morrow zones, Tonkawa, and other Pennsylvanian sands. Its position south of booming Harper County, west of Woodward County and its own busy campaign to the Pennsylvanian, and east of the Texas Panhandle's big pre-Permian gas and oil areas make it one of the most highly promising wildcat arenas in the Anadarko basin.

Five wells add to luster of Nebraska field

Good production in Dakota sands is reported in western Nebraska's Brinkerhoff field in Banner County. This Denver basin field got two new producers offsetting production to the north. Pan American Petroleum Corp. and Pubco Petroleum Co. got the wells.

Pan American 2 Van Pelt-L, C SW NE 10-17n-56w, pumped 630 bbl. of oil daily. This is the best yet for the field. Pubco's 2 Young in C SE NW 10-17n-56w made 560 bbl. daily. This is a Dakota "J" sand field. There are five wells producing in the area. Production tests are under way at another, and locations are down for two more wells.

No letup seen in Palo Duro, Texas, hunt

There is no quitting in the Palo Duro basin. Frankfort Oil Co. staked another granite test in the far western Texas Panhandle where a 20-well program is reported planned.

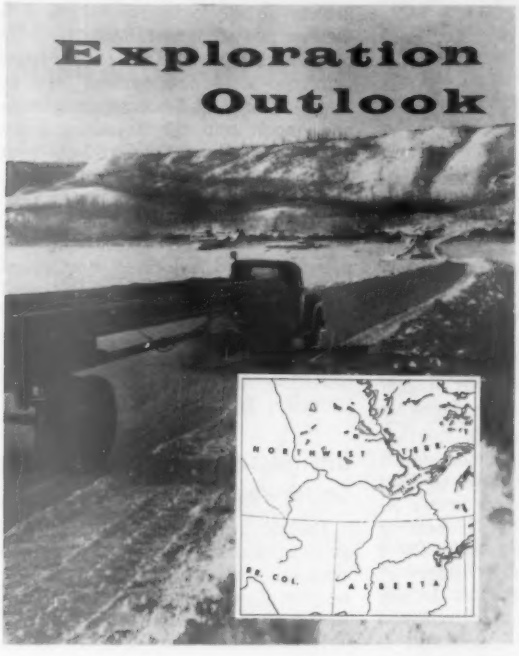
The new test is the 1 Gill in Section 16, Block B-5, H&GN Survey, 6½ miles northeast of Dawn on the Deaf Smith-Randall County line. This Palo Duro basin activity, although discoveryless, is one of the drilling highlights in the Texas Panhandle this year. More wildcats have been put down throughout the basin so far this year than in any previous comparable period. Only one well has had production in the current play . . . Shell Oil Co. reworked the discovery well at Alamosa Ranch, coming up with new-pay oil production several weeks ago.

Colorado's southeast area on the rebound

Southeastern Colorado's McClave gas field at the extreme northwest corner of the Anadarko basin and in Las Animas arch country is enjoying a rebound in development.

This Kiowa County gas area got a new stepout, pipe set at another, and location is ready for still another stepout. Frankfort Oil Co. completed the 1-16 State in C SE NW 16-20s-48w for an open-flow gage of 5,450 M.c.f.d. from Morrow Pennsylvanian perforations at 4,728-48 ft. Location is 2 miles north of previous field limits. Pipe is set at the 1 Izard in C SW NE 4-20s-48w. Location is made for the 1 Pyles in NW SE 17-20s-48w, ¾ mile southwest of the Izard.

McClave was opened as a Pennsylvanian gas field in remote wildcat country several years ago, but activity died down until recently. It is an encouraging addition to the exploratory interest rippling up and down the Las Animas arch this year.



Far North entices explorers

BUSY summer plans promise a widening search for oil and gas in the Far North when winter hardens the impassable terrain of Canada's near-Arctic regions. One of the most remote and untested exploratory frontiers on the continent awaits the drill. A huge land deal is being consummated in readiness for winter's arrival and subsequent favorable drilling conditions. This coming north-country wildcat probe and this summer's planned gas development in British Columbia put northwestern Canada at a top-interest exploratory level.

Wildcats are planned

. . . in the Northwest Territories this winter by a five-company group currently acquiring a 50% interest on 1,224,000 acres of unborn oil and gas domain. Home Oil Co., Signal Oil & Gas Co., Kern County Land Co., Alminex, Ltd., and United Oils, Ltd., will pay $3.5 million and drill five wells on acreage held by Canada Southern Petroleum, Ltd., Magellan Petroleum Corp., and Oil Investments, Inc. This deal calls for at least $3,000,000 more in drilling and exploratory work over the next 5 years. The group is after rights on the North Petitot River structure, a rival to Berland River's might. This feature covers about 160,000 acres on the British Columbia-Northwest Territories line.

Interest is high

. . . in Petitot River's potential. Canada Southern says recent seismic surveys indicated a subsurface structure that is the largest ever mapped east of the Canadian Rockies. About 90% of the feature lies on company acreage.

This gas area hit the news last spring when Gulf States Oil Co. of Canada tapped an estimated 150 M.M.c.f.d. from Middle Devonian-Slave Point dolomite, correlative to the famed Swan Hills pay. The prolific gas find, 16 miles south of the Northwest Territories border, uncovered evidence of major reefing present in two or more horizons. If further drilling substantiates the reefing, northeastern British Columbia, northwestern Alberta, and the southern Northwest Territories will really be in the exploration business.

When ice comes

. . . to northwestern Canada, Home Oil, as operator, plans to use two seismic crews and will drill two or three wildcats. The first one will be on the North Petitot River structure. This drilling program will be an important and closely watched step in proving what lies ahead for the vast northern territories of Canada. Another successful hit will sire fast development. A dry hole will not necessarily put any damper on the area. This is new wildcatting country. Many holes will be put down.

Weather is king

. . . in Canadian drilling whether it be summer or winter. If wet weather would cease in northeastern British Columbia, this summer would see the biggest drilling foray yet in this province. Eight rigs are slated to work in the Jedney-Bubbles-Laprise Creek region. Bad weather is causing delay in this program with only two rigs going. The team of Pacific Petroleums, Ltd., Imperial Oil, Ltd., Sunray Oil Co., Charter Oil Co., Ltd., Medallion Petroleum, Ltd., Canadian Northern Oil & Gas, Ltd., and Canadian Homestead Oil Co. are backing a six-rig program in Jedney-Bubbles which calls for 35 wells. Others will move in rigs to Laprise Creek when roads improve. The success of this over-all campaign in British Columbia this summer depends entirely on how soon equipment can move in.

North to the Pole

. . . is almost a reality. Such discoveries as Petitot River come as a rewarding climax to the big northward trek that began in Canada less than 3 years ago. Leasing sprees have spread throughout the forbidding territory from Edmonton clear up to the Arctic Ocean. Vast acreages have been acquired above the Arctic Circle. Drilling hasn't started, but ground work is underway this summer in some of the Arctic Islands. Nowhere in the oil world is exploration more daring, difficult, or profitable than in Canada.

The search for oil here began on the prairies, fanned westward and northwestward into the Rocky Mountains and foothills, jumped into the northern muskeg kingdom, and now the push into the Arctic is with us. Each drilling winter in Canada will give us new exploratory goals to shoot for. In coming years these targets will be far to the north of present producing trends.

—John C. McCaslin.

British Columbia rig activity nears summertime peak, with 17 turning

IN CANADA Pacific Petroleums, Ltd., as operator of a group carrying out a large-scale gas-development project in northeastern British Columbia, is currently working six contract drilling rigs and may put a seventh to work in the near future. Numerous companies are associated with Pacific in its drilling program that currently encompasses development wells in the Jedney-Bubbles gas discovery region.

A new location was recently staked for an exploratory test in the general Sikanni Chief River region, about 120 miles northwest of Fort St. John by Pacific and this could be its seventh driller, if suitable drilling equipment can be contracted. This rank wildcat may also be a deep, 10,000-ft. test.

17 rigs busy . . . In addition to the project being spearheaded by Pacific Petroleums, 11 other development and exploratory wells are under way in northeastern British Columbia at the present time. The 17 rigs active are close to peak summertime activity of the past number of years. The high rate of operations in northeastern British Columbia is a complete turnabout as other provinces' exploration and development activity is way below the summer month rates of 1958, 57 and 56. The growing gas requirement of the Westcoast Transmission system, with which Pacific is closely associated, is fostering the present play.

Results to date of both Pacific's and other operators' exploration projects are continually increasing the area's gas-producing potential as well as its oil producibility. Approval of any one of the four proposals to build oil-transmission facilities in the northeastern sector of the province will add further incentive to operating companies, and if the go-ahead sign is flashed by the British Columbia government, in time for construction of a pipeline this fall, it will mean a busy winter for the drilling contractors and oil operators in this region come freezeup next fall.

A second look at the wells now being operated by Pacific reveals that Imperial Oil, Ltd., Sunray Oil Co., and Charter Oil Co., have a stake in most of the development drillers, while the new wildcat at Sikanni Chief River will be put down on acreage owned jointly by the Pacific-Westcoast Production Co. team and Hudson's Bay Oil & Gas Co., Ltd. Newest start in the Jedney-Bubbles gas area is the Pacific-Sunray-Imperial-A-61-L Sojer test. This venture on the east side of the presently proved gas area, on Unit 61 of Zone L, NTS Map No. 94-H-4, is about 3 miles east-northeast of a previous gas success by the operating company's group and about nine miles northwest of a Nig Creek field gas completion. Drilling equipment owned and operated by Regent Drilling, Ltd., is now being rigged up at this venture.

The other tests in this region, which lies about 60 miles northwest of Fort St. John, include: the same team's A-65-J Jedney driller, that is nearing completion depth; and its D-88-I Bubbles well, still in early stages of drilling. The group's B-30-B Jedney development well that has indicated gas success has been cased and is awaiting production testing operations. These particular wells are being drilled on lands included in a development deal with Imperial Oil, Ltd. Under terms of these agreements, interests in various wells vary to a great extent depending on completion zone, and particular lease rights or permit rights on which the wells are drilled.

At Buick Creek, immediately north of the Peace River survey block and 40 miles north-northwest of Fort St. John, Pacific is drilling its No. C-12-B development well and No. C-14-B. However, due to a forthcoming land sale to be conducted by the British Columbia Department of Mineral Resources, all details on these drillers are being withheld by the operator. Lands in close proximity to the pair of wells are up for bid at the July 30 sale that holds promise of being the largest in the province's history.

The wildcat on Permit No. 966 that was issued to Hudson's Bay Oil & Gas Co. has been named Pacific-H. B. C-37-L Pocketknife and it is positioned on Unit 37 Block L of NTS Map No. 94-G-7. At that site it is 18 miles northwest of the settlement of Sikanni Chief on the Alaska Highway, and 20 miles northwest of the Sinclair Canada and associates X-B-18 capped potential gas producer. Sinclair drilled an unsuccessful exploratory test about 10 miles due north of the new wellsite and a pair of ventures that failed to indicate gas or oil production were drilled 16 miles to the east—one by Pan American and Dome Petroleum and the other by Phillips Petroleum Co.

Operators of the other 11 current drillers in northeastern British Columbia, and the general area of their operations include: Dome Petroleum with two field development tests at Laprise Creek on Basco farmout lands and one test in the Boundary Lake oilfield area; Triad Oil Co., Ltd., with wildcats in the Prairie Creek district and Findlay Forks area; Fargo Oils, Ltd., with a wildcat at Blueberry; Gulf States' test at Clarke Lake; Imperial Oil and associates venture at Nelson Forks; Pan American's well at Beaver River; Sohio Petroleum Co.'s wildcat at Tupper Creek; and the Texaco operated Northern Foothills Agreement Group's well at Cameron River.

Big gasser stirs Southwest Saskatchewan

Prolific gas production is reported at a wildcat in southwestern Saskatchewan, stealing some of the glow of western Canada's big gas push in the British Columbia sector.

Imperial Oil, Ltd., unofficially reported last week an absolute open-flow potential of 50,500 M.c.f.d. from Viking sand at its 6-16-24-25 Bayhurst wildcat, 35 miles south of Smiley-Coleville field. This well was drilled last October. However, back-pressure tests on the well indicated the big open-flow rate. Confirmation and offset drilling around the discovery has resulted in two more indicated gas wells. Perforations in the discovery well itself were at 2,184-89 ft.

The 10-10V Bayhurst well, LSD 10, 10-24-25w/3, flowed 10,000 M. c.f.d. from Viking. The 7-18V Bayhurst on LSD 7, 18-24-25w3, flowed 1,700 M.c.f.d. from Viking. Some dry holes were drilled 2¾ miles southeast of the discovery well.

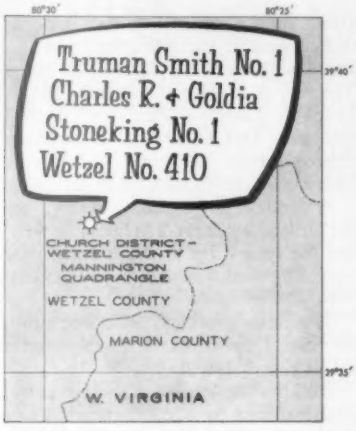
Alberta's Waterton Park adds new producer

Drilling in Alberta's tremendous Waterton Park gas reserve continues. Shell Oil Co. of Canada, Ltd., reported that its 5 Waterton Park well flowed 13,150 M.c.f.d. and 29 bbl. condensate per million on recent production tests. This Mississippian well is the north offset to the 1 Waterton Park gas discovery well which is shut in. Production at the new well is from 13,260-13,300 ft., and 13,220-60 ft.

Other activity in the big field includes the 7 Waterton Park which is bottomed at 10,239 ft. Shell is working on lost circulation here. The 8 Waterton Park location has been staked, and it is understood that other wells will be drilled here in the near future.

Oriskany yields a gasser in West Virginia

First Oriskany test in the Mannington Quadrangle, Church district area of Wetzel County, West Virginia, hit gas, intensifying interest among larger operators. The Truman Smith 1 on the Charles R. and Goldia Stoneking farm, was completed flowing 125 M.c.f.d. through 7-in. production string after fracture from



REMOTE GAS PRODUCTION at a West Virginia wildcat will stir exploration in Wetzel County's Church District.

Oriskany and Chert. An 11-hour rock pressure measured 1,270 psi. Total depth is 7,694 ft.

The successful completion of this remote wildcat should increase wildcatting in this area of the state.

Lewis County gets gasser

Shallow gas production is reported at Allegheny Land and Mineral Co. 1 Camden Heirs, Vadis Quadrangle, Freeman Creek district, Lewis County, West Virginia. The well made 10,162 M.c.f.d. through 5½-in. production string from Injun sand after fracture. A 24-hour rock pressure was 670 psi. Total depth is 1,523 ft.

Colorado's Paradox gets confirmation well

IMPORTANT confirmation news was made in southwestern Colorado's portion of the Paradox basin at Texaco, Inc. 2 Ute Mountain Tribal in NE SE 21-33½n-20w. This well confirms Towaoc field in Montezuma County.

Texaco's well flowed 488 bbl. of oil per day on ½-in. choke from perforations at 5,712-16 ft. in the Hermosa Pennsylvanian at 5,712-16 ft. It extends the field southeast and is the first strike in the area since the big discovery well came in for more than 1,200 bbl. per day last January.

Location is made ½ mile north of the field discovery at The California Co. 4 Calco Superior Ute Tribal in C SW SE 16-33½n-20w. It will test to Paradox or 5,850 ft. Dry holes have been drilled to the northeast, east and southeast of the Towaoc strike. This confirmation well is an important clue to further drilling in the field area. It will certainly lift sagging hopes for big Pennsylvanian oil in this portion of the basin. Towaoc was the first commercial producer for the Colorado sector of the Paradox.

Ohio shows activity in several areas

A CLOSELY watched wildcat in northwestern Ohio's Fulton County was completed as a failure at 2,811 ft. in the Trenton-Black River. McClure Oil Co. 1 Leroy D. Keefer, Chesterfield Township, Section 31, found the Trenton at 2,298-2,811 ft. This wildcat was of interest due to its nearness to Michigan's Trenton play area.

Another Trenton wildcat in Ohio, Glen and Helen I. Miller 2 Fee, Defiance County, Mark Township, Section 4, was completed in Trenton at 1,764-93 ft., total depth. The well reportedly flowed 1,000 bbl. in 7 days, natural. It is now flowing and pumping 30 bbl. of oil and 75 bbl. salt water. This wildcat, also in northwestern Ohio, should encourage the big push to Trenton in northwestern Ohio.

Clinton developments in Ohio include a new gas discovery in Coshocton County's Monroe Township.

W. H. Patten 1 Edwin A. Robinson, Lot 26, had 200 M.c.f.d., natural, and after fracture it made 1,090 M.c.f.d. Rock pressure was 1,060 psi. Clinton was at 3,411 to 3,428 ft.

Coshocton County is one of the state's most active areas. Ditch & Hanna completed the Jesse Bowers offset well for 600 bbl. of oil and 500 M.c.f.d., after fracture. This well is located in Tiverton Township, Section 21. Clinton sands were at 3,110 to 3,123 and 3,129 to 3,163 ft.

Freak pay . . . A freak pay was found at B. Holl et al. 1 John Amanh, Hocking County, Marion Township, Section 33. The proposed Clinton offset try was shut down for treating when 1½ bbl. of high-gravity oil and a gas show were found in the Columbus lime. There is no production from Columbus in Ohio. Shows were at 1,804-20 ft.

New starts keep Sacramento Valley active

New wildcats announced or getting under way in the Sacramento Valley area assures activity there will remain at a fast pace. With a dozen rigs already at work on wildcat or field locations, three more tests were being prepared for this gas-producing area.

In Glenn County's Hamilton City area, General Petroleum Corp. was grading location for 54-10 Moda Unit in 10-22n-2w. Butte County was given a 3,500-ft. test by Universal Consolidated Oil Co., its 1 Nissen in 15-20n-1e. Union Oil Co. was under way with its 1 Amerada-Pedrick in 12-6n-1e, near Binghamton in Solano County. It also announced a new wildcat for this county. The planned test, 1 Liberty Farms, is 2½ miles southwest of the Liberty City gas field, in 19-5n-3e.

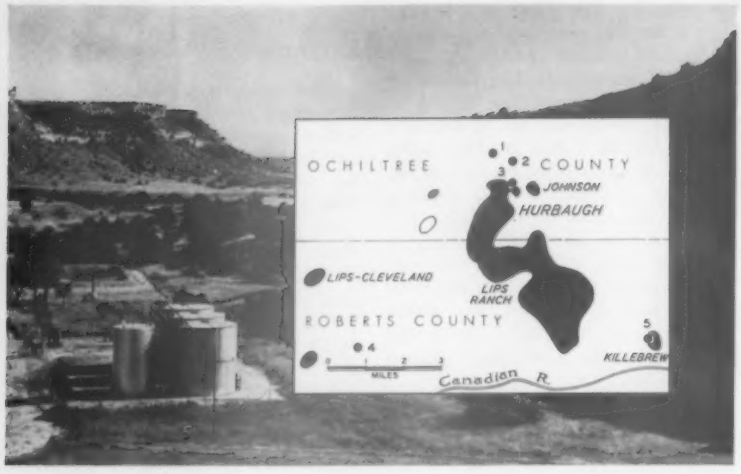
. . . An extensive core-drilling program was announced by Texaco, Inc. Eight tests will be drilled in four counties, including a 6,500-ft. hole in the McDonald Island area of San Joaquin Valley. The Vacaville area of Solano County will receive three tests, ranging from 3,500 to 6,700 ft. deep.

The four other strat tests will be in the Pleasant Creek and Winters areas of Solano County and in Tehama County's Vina area.

Green River continues to add gas reserves

The Baggs area of the Green River basin in southern Wyoming leads current exploratory interest in that state. The discovery well of State Line field, a Gulf Oil Corp. operation, tested 2,529 ft. of oil on test of the Fort Union. Tests earlier got more than 5,000 M.c.f.d. Location of this discovery well is 4 miles southwest of the unit's first try which was a failure. This unit is in southwestern Carbon County.

Other Green River area news includes the fourth well at Trail Unit in Sweetwater County. Mountain Fuel Supply Co. completed 4 Trail Unit in NW SW 15-13n-100w, for a calculated absolute open flow potential of 22,600 M.c.f.d. from Mesaverde Cretaceous at 5,661-86 ft., 5,725-95 ft., and 6,911-83 ft. This is the unit's fourth well. The field opened back in 1952 but it wasn't until last year that development began to flourish here. The 2 Unit well made 40,000 M.c.f.d., the 3 Unit made 34,500 M.c.f.d.



THE TEXAS PANHANDLE'S oldest pre-Permian producing area, Lips Ranch (opened in 1949 by Sinclair Oil & Gas Co.) is undergoing an important new drilling sprint with old wells the object of rework success. Photo courtesy Pan American Petroleum Corp.

Old Texas area has new look with panhandle revival program

THE TEXAS PANHANDLE'S oldest pre-Permian producing area is undergoing a revival program . . . and with good success. Southern Ochiltree and northern Roberts counties are in the midst of a spirited rework, new discovery, and reentry program. Scene of action is the Harbaugh-Johnson-Lips Ranch area.

New Novi Pennsylvanian lime production is reported at Pan-Petro, Inc., 1 N. J. Barrett (1 on map) in Section 126, Block 13, T&NO Survey, 15 miles southeast of the town of Farnsworth. The operator completed the well for 439 bbl. of oil daily on 18/64-in. choke from Novi perforations at 8,450-73 ft. Moving ¾ mile southeast, Pan-Petro went into an old dry hole in Section 127, Block 13, T&NO Survey, the 1 Helton. Novi was perforated at 8,464-84 ft., and gas flowed at the daily rate of 3,000 M.c.f. with oil spray. Later the gas changed to oil flow. After treating, the well kicked off flowing 365 bbl. of oil in 10 hours. The flow ranged from 30-50 bbl. per hour with 2,000 M.c.f.d. Potential tests are due.

The Novi successes at 1 and 2 on map have sparked interest in the pay's potential in the Lips Ranch area. Parker Petroleum Co. and Rip C. Underwood will work over the 1 W. J. Johnson in Section 30, Block 13, T&NO Survey (3 on map). This well is the discovery well for W. J. Johnson field. It flowed 212 bbl. per day from Atoka Pennsylvanian when originally completed. If the Novi proves successful at the workover try, this production would move 1 mile south.

Recompletion work down in Roberts County to the south is adding important new production. Pan American Petroleum Corp. completed its 7 Lips Ranch "B" as a Cleveland oil discovery (4 on map). It made 318 bbl. of oil per day plus 0.4% water on ½-in. choke from perforations at 7,862-74 ft. This well is 3 miles southeast of the discovery well of one-well Lips Cleveland field.

At Killebrew Morrow field (5 on map), Lion Oil Co. completed 1 Killebrew in Section 208, Block 42, H&TC Survey for 10,000 M.c.f.d., calculated absolute open flow. Perforations were in the Morrow Pennsylvanian sand at 8,910-25, 8,967-77 ft. This is the second well in the field.

Pennsylvania's Rockton gets biggest gasser

CENTRAL PENNSYLVANIA'S Rockton field in northwestern Clearfield County had its biggest gasser with the completion of New York State Natural Gas Corp.'s 11 Helen Gordon in Huston Township. The well made 70,000 M.c.f.d. in the Onondaga chert. Total depth was 7,160 ft. Rock pressure was 3,435 psi. in 19 hours.

About 12 wells are drilling in this general area. The newest location was staked by Shell Oil Co. As new wells are completed, the undrilled area between Rockton and Benezette-Driftwood pools becomes smaller. If these two pools merge, the producing area will extend about 38 miles on a northeast-southwest trend along the Chestnut Ridge anticline. The northern half of the trend is producing from the Oriskany sand and the southern half from the Onondaga chert-Oriskany sandstone section.

Other state news . . . A well is being drilled east of the Allegheny front in Franklin County by Shearer & Herr. The well is drilling at 1,200 ft. This is Franklin County's first test for oil and gas. This county is in southern Pennsylvania adjoining Maryland. There is no production for many miles.

A wildcat in Greene County, being drilled by John T. Galey, is waiting for rotary rig to move onto location. The well was drilled to 2,755 ft. with cable tools.

The state's second offshore well, the No. 1 on Block 2, Lake Erie, is drilling at 3,285 ft.

Another significant wildcat was recently staked by Manufacturers Light & Heat Co. on the Meuller-Herr property in Stewart Township, Fayette County. This wildcat is being drilled on the Laurel Hill anticline.

Indiana records big flowing Bethel well

ONE OF THE BEST discoveries of the year for Indiana is on the books. It is Kelly, Conrad & Kaye Oil and Marvin Walker's 2 J. W. Adams in NE NE SE 24-1s-11w, Gibson County.

This new Illinois basin producer flowed 400 bbl. of oil per day through choke in the Benoist Mississippian Bethel sand at 1,828-61 ft. In 4 days the well flowed 1,600 bbl. This new area east of Patoka should see more action. The 3 J. W. Adams in SE SE NE 24 will be tested in the Benoist at 1,846-63 ft. Operators are preparing to fracture the Benoist.

. . . Other Illinois basin news includes another prolific producer in the new area 3 miles east of Enfield in White County, Illinois.

Coy Oil Co. completed the 2 Virgil T. Murphy Unit in SW NW SW 13-5s-8e for 960 bbl. of oil per day through choke in the Aux Vases Mississippian at 3,126-46 ft. Another well, M. C. Milam's 2 J. P. Smith in SE SW NW 13, is being tested in the Aux Vases at 3,128-42 and 4,146-55 ft.

Ten wildcats spotted in nine Etex counties

DRILLING REPORTS on East Texas operations last week announced locations for 10 new wildcats, scattered over 9 different counties. Some are deep tests and in areas that have had little exploration. Collin County, which has no production, is in line for another deep try. By counties, the new operations are:

... **Hill County.** Humble Oil & Refining Co. 1 Ella Freeman is expected to reach the Ellenburger at its projected depth of 10,500 ft. The well is 2½ miles southeast of Grandview on a 95-acre tract in the John Hays Survey.

This immediate area has had little drilling to furnish subsurface control. Hunt Oil Co. 1 Wright, in the same survey, was drilled to 6,693 ft. in 1948.

... **Collin County.** Rodman & Noel, Odessa, will start in the near future at 1 M. L. Mell, 3 miles west of the town of Melissa. Location is on a 73.94-acre tract in the John Emberson Survey. Projected depth is 10,500 ft.

Nearest deep test in the area is Humble 1 J. L. Atkins, approximately 4 miles to the northeast of 1 Mell, in John McCarrah Survey. Humble's operation drilled to 12,175 ft. in 1957. Top of the Pennsylvanian was logged at 3,192 ft. on elevation of 653 ft. Several cores below 6,500 ft. had light shows.

... **Franklin County.** Gibson Drilling Co., Kilgore, has staked location for a Paluxy test 4 miles west of Talco. The new try is 1 G. M. Elliott, on a 94-acre tract in the Isaac Pennington Survey, A-365. Projected depth is 5,000 ft., with a company rig.

... **Van Zandt.** R. J. Caraway had a rig up at 1 W. A. McCoy, Smackover wildcat ¾ mile southeast of Fruitvale and 5 miles northeast of a Smackover gas discovery in the Fruitvale field area. Drill site is on a 100-acre tract in the James Cheshire Survey, A-181. Production will be sought to 13,000 ft.

The well is reported to be on a block of 3,500 acres, surveyed by Pan American Petroleum Corp. Support money also is coming from Shell Oil Co. and Atlantic Refining Co.

... **Wood County.** E. A. Ellison, Tyler, has made location for 1 F. W. McLeroy on a 26-acre tract in the Elijah Allen Survey, A-8, 2½ miles southeast of Winnsboro. It is a Woodbine test, scheduled to around 5,100 ft.

... **Shelby County.** May-Milan & Associates, Smackover, Ark., will drill a Paluxy wildcat 10 miles northeast of Shelbyville in the eastern portion of the county. The well is B-1 Pickering Lumber Co., located in the E. C. Thomas Survey, A-716. Scheduled depth is 4,000 ft. Clyde Ritchey, Smackover, has drilling contract.

... **Robertson County.** Skeeters & Curry, Longview, will drill 1 Eugene Fields as a 5,100-ft. Edwards Lime test, 3 miles west of Calvert. Location is on a 327-acre tract in the shallow Calvert field.

... **Leon County.** Barnwell Drilling Co., Shreveport, will drill a 9,000-ft. wildcat 15 miles east of Centerville. The test is 1 Swift Estate, James R. Davis Survey, A-224. It is being drilled as a Woodbine test, but the projected depth is expected to carry it into the top of the Glen Rose formation. Location is on a 790-acre tract. Barnwell is said to hold a block of 13,000 acres in the area.

... **Rusk County.** First reports carried two new operations for this county.

Humble Oil & Refining Co. 1 John R. Alford, Abner Nail Survey, A-603, is 6 miles northeast of Mount Enterprise. Projected depth of 9,000 ft. is expected to penetrate the Travis Peak, and possibly into the top of the Cotton Valley formation. Nearest test in the area to furnish control lies about 2½ miles to the northeast in Palona County. This was Belcher & Crofton 1 Hudman, drilled dry to 7,078 ft. in 1945.

Fred Whitaker, Carthage, has made location for a Travis Peak test 6 miles southeast of Kilgore. The well is 1 Williams O. Compton, Stephen C. George Survey, A-311. Location is 3 miles north of nearest production in the Henderson field. Nearest test in the area is B. W. Hemphill et al. 1 Ethel Edwards, 7,840-ft. dry hole 2 miles to the east in Gardner Wilbank Survey.

Dual gas area opened in Limestone County

A new Rodessa and Pettet gas-condensate field has been opened in southeastern Limestone County, East Texas, near Oletha field.

W. R. Hughey & Associates, Tyler, completed their 1 F. D. Connell for 37 M.M.c.f.d. from Rodessa perforations at 6,692-98, 6,723-26, and 6,730-36 ft. The potential was calculated open - flow. Gas - condensate ratio was 35,700:1, of 53.2° gravity. Shut-in pressure on this zone was 2,720 psi.

Calculated open - flow potential from the Pettet was 2,450 M.c.f.d., plus 17 bbl. of 58° condensate per 1 M.M.c.f.d., or a ratio of 58,800:1. Shut-in pressure on the Pettet was 2,734 psi. Perforations in the Pettet were at 7,256-66 and 7,272-76 ft.

DUAL GAS DISCOVERY from Rodessa and Pettet formations is W. R. Hughey and Associates 1 Connell. Nearest similar production is Oletha field, to the northeast.

Total depth was 7,605 ft. The discovery is 3 miles south of the town of Oletha, and 4 miles southwest of Rodessa and Pettet gas production in Oletha field. Location is on a 204-acre tract in Joseph Ferguson Survey, A-194.

Other companies with holdings in the area include Three States Natural Gas Co., Shell Oil Co., Arkansas Fuel Oil Co. and McAlester Fuel Oil Co.

Goat Hill Unit will get Mesaverde test

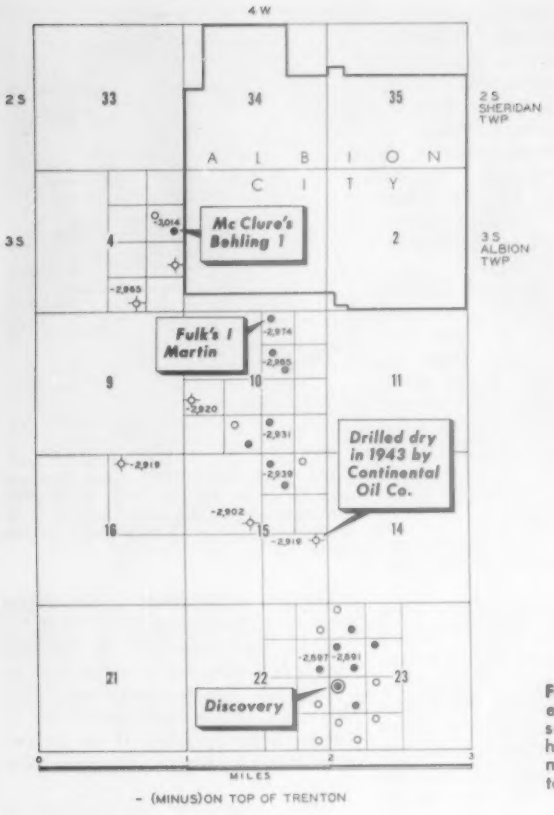
Location is announced for a wildcat to Mesaverde or 5,500 ft. on the new Goat Hill Unit in the Green River basin of southwestern Wyoming.

The well is Belco Petroleum Co. 1 Goat Hill Unit, C NW NE 28-31n-113w, Sublette County. Location is 6 miles north of Frontier sand production at Deer Hill field. This unit was approved early in July. It includes 20,710 acres. Carter Oil Co.

Penn discovery hinted for Southwest Kansas

Lansing Pennsylvanian gas production is indicated at a wildcat in southeastern Morton County in southwestern Kansas.

Hamilton Brothers, Ltd., 1-22 Mingenback, a deep inside-Hugoton field wildcat, flowed gas on drill-stem test at 4,235-62 ft. Testing continues. Location is in C SE NW 22-35s-40w, 6½ miles east of Wilburton and 8 miles northeast of closest deep production at Wilburton Topeka and Morrow gas field.



FROM the discovery south of town, successful drilling has progressed 3 miles northward to the city limits.

In Michigan . . .

Albion braces for townlot spree

ALBION for months now has been the center of the southern Michigan oil boom. The discovery drilled last December is 2½ miles to the south of the city.

Now Albion is bracing for a townsite drilling play. Perry Fulk 1 Martin, NW NW NE 10-3s-4w, just south of the city limits, flowed oil on drillstem test in Trenton at 4,100-92 ft. Half the town's populace was on hand for the "drill in." They got an unscheduled show. Drillers lost control and oil sprayed the lease site.

Fulk, an Olney, Ill., independent, removed any possibility that the northwest moving play would sidetrack the city itself. A producing well was drilled earlier ½ mile northwest on the western edge of the city limits.

Apache Oil Co. spudded a test in SE SE SE 27-2s-4w on the north side of the city. Petromin has a location inside the city limits waiting clearance by the Albion council.

Albion's Mayor H. A. Rigder said the council has been working for weeks to shape up drilling regulations for the townsite. He said final action would come July 27.

The commission already has made it clear there will be no "lot" drilling. Units will have to conform to state regulations.

The commission is expected to call for bids on several city-owned parcels of land before the end of August.

McClure & Palmer 1 Ott, in NW NW NW 20-2s-4w, wildcat 4 miles northwest of Albion field, logged Trenton at 4,129 ft. (-3,123 ft.) and showed 300 ft. of gas on drill-stem test at 4,400 ft. Drilling is going ahead.

McClure & Hartman 1 Willis, SE SE NW 17-4s-6w, Calhoun County, 11 miles southwest of Albion field, logged Trenton at 3,445 ft. and cable tool tested tight oil pay at 3,577 ft. Drilling was halted at 3,972 ft. for orders.

Bell & Gault 1 Bissell, SE SW NE 8-4s-2w, Jackson County, 7 miles due east of Pulaski field, where 3,800 M.c.f. gas was logged in Trenton 3 weeks ago, has been cased with 5-in. at 4,012 ft. before deepening.

Michigan's Trenton pool is extended southeast

ANOTHER EXTENSION south of Scipio field, Hillsdale County, was racked up as Davis Drilling Co. 1 Chilson, NW NW NW 25-5s-3w, logged Trenton at 3,549 ft. dolomite at 3,648 ft. and oil zone at 3,840-45 ft. Casing was cemented at 3,845 ft. Well apparently extends Trenton pool ½ mile farther southeast.

The Hanover play 7 miles due east of the Scipio-to-Albion development still was triggering deals but so far operators have been unable to test below original Trenton gas pay at 4,012 ft.

An 80-acre southwest offset was turned on a farmout for $50,000 cash and one-quarter override. Six drilling deals from 1-6 miles out are due to start.

State Supervisor of Wells established 20-acre drilling pattern for the Hanover area after hearing July 16. At the same time 40-acre pattern was set for the McBain play, Missaukee County.

With a number of drilling deals awaiting rules and regulations by the city of Albion, the council has retained Lee Miller, East Lansing, consulting geologist and former State Conservation Department proration engineer, to advise council on rules for development in the city. One producing well has been drilled just west of the west city limits. Others are drilling on the south side and northwest.

Frakes—new Hitchcock County, Nebraska, discovery

The discovery well of Frakes field in Nebraska was completed pumping 184 bbl. of oil daily to give the northwestern Kansas-Las Animas-Cambridge arch play a big boost. This new addition to one of the nation's most attractive new oil provinces is Skelly Oil Co. 1 Frakes in SE SW NW 23-1n-32w, Hitchcock County, 1½ miles north of Burr Oak field. Production is from Lansing-Kansas City Pennsylvanian perforations at 3,889-84 ft., 3,948-50 ft., and 3,999-4,001 ft.

This new field is the third for Skelly in this area. It lies 2 miles northeast of new Reiber field where Skelly just completed a south offset, the 1 Newport, C SE NE 28-1n-32w. That well pumped 243 bbl. of oil daily from Lansing-Kansas City.

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Schlumberger Focused Logging directs measurements into specific volumes of formation, giving you:

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A decade of research at Schlumberger has produced five Focused Logging Methods. Each, fitted to the right borehole and formation conditions, becomes part of a true oil-finding technique. Your Schlumberger engineer is trained and qualified to recommend the proper logging program for your well.

The artist's concept of the patterns of Schlumberger Focused Logging is represented by sharply sculptured sections lifted from the formations surrounding the borehole. (1) Sonic Log (2) Proximity Log (3) Laterolog (4) Microlaterolog (5) Induction Log.

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Most important, Claymont Pipe is hydrostatically tested to assure weld soundness.

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- Overhead gorge and river crossings
- Underwater crossings

Claymont Pipe for any use is available in 22″ through 36″ O.D., and 40-foot lengths. Special sizes and lengths are also supplied to meet customer specifications. Contact the CF&I sales office nearest you for complete details.

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6972

Rosseau wildcat opens two gas-condensate pays

A new gas-condensate field is being opened southeast of Thibodaux, in northern Lafourche Parish, Louisiana Gulf Coast.

Its discovery well, drilled by Hassie Hunt Trust and others, is completed in two zones, one perforated at 13,004-22 ft., and the other at 13,316-22 ft.

Flow from the upper pay was at the rate of 4,250 M.c.f. of gas and 47 bbl. of 54.1°-gravity condensate per day through 10/64-in. choke. Flowing pressure was 7,800 psi.

The lower zone produced 168 bbl. of 46.6°-gravity condensate with 2,100 M.c.f. of gas per day through 10/64-in. choke with pressure of 7,100 psi.

Location, 1-A Verdin-Parro, in 64-15s-17e, is 1¼ miles northwest of Rosseau field, discovered by the same operators in 1952. Rosseau now has four wells, productive of gas and condensate from 9,500 and 10,400-ft. sands.

Drilling already is under way on a confirmation test, 1 Billello-Martinez, southeast of the discovery well, between it and Rosseau field.

DeLarge outpost gets rich condensate flow

A west outpost test at Bayou DeLarge, in the coastal marshes of Terrebonne Parish, Louisiana, is being completed as one of the richest gas-condensate wells in the area.

The well, Union Producing Co. 6 Buckley-Bourg, flowed at the rate of 563 bbl. of 48.6°-gravity condensate with 5,850 M.c.f. of gas per day during tests through ¼-in. choke. Its pay is perforated at 13,556-66 ft. and 13,573-82 ft.

Its location is nearly ¾ mile west of Union's 2 Buckley-Bourg, nearest current producer. It is ½ mile northwest of the field's depleted discovery well, drilled by Fohs Oil Co. in 1938.

McAlester basin wildcat is dual-zone discovery

Dual-zone gas production is reported at a southeastern Oklahoma wildcat. The discovery well is Southern Union Gathering Co. 1 Brown in McIntosh County, NW SE SW 16-9n-15e. Location is east of Raiford field.

Through Hunton Siluro-Devonian lime perforations at 4,750-4,826 ft., the well flowed 1,905 M.c.f.d.; from Cromwell sand it flowed 2,400 M.c.f.d. from 4,203-33 and 3,283-98 ft. This well is an important addition to the expected reentry into the McAlester basin's potential in southeastern Oklahoma. Northwestern Arkansas has seen most of the drilling action in the past few years. This is one of the country's biggest and yet practically untouched basins. Its promise as a gas giant is becoming more and more evident; its promise as an oil basin needs some more wildcatting for evaluation. There are signs of a definite lift in exploratory activities throughout the Oklahoma and Arkansas portion of the long east-west basin which lies between the Boston Mountains on the north and the Ouachita Mountains on the south.

Far-western Oklahoma Panhandle sees action

Cimarron County's fast-growing Southeast Griggs field in the far Oklahoma Panhandle continues to add extension discoveries. The latest is a long Oswego and Topeka extension, Graham-Michaelis Drilling Co. 1 Fleming, C NW SE 2-1n-9e CM, 14 miles southeast of Keyes in the southeast corner of the county.

This well made 4,300 M.c.f.d. from Topeka Pennsylvanian at 3,478-82 and 3,440-44, 3,426-30 ft. It flowed 4,500 M.c.f.d. from Oswego perforations at 4,326-36 ft.

This well is 2 miles north of Oswego production and 3½ miles north of Topeka production in the field.

Two horizons produce in Texas coast discovery

Both Wilcox and Frio sands have proved productive in a wildcat drilled by George A. Musselman, 2 miles north of Meyersville in the South Cottonwood area, southwestern DeWitt County, in Texas' central coastal district.

Wilcox sand, perforated at 7,649-58 ft., is rated good for 14,800 M.c.f. of gas daily, open flow, with liquid recovery at 23 bbl. per 1,000 M.c.f. Pay is the Mackhank zone.

Frio sand, perforated at 2,744-49 ft., tested for an open-flow potential 14,700 M.c.f. of dry gas daily. Other shallow Frio sands have indicative showings.

The well, 1-A Edgar F. Hartman, was drilled to 7,825 ft. It is 100 ft. southeast of the operator's 1 Hartman, abandoned earlier this year following a blowout in one of the shallow zones.

Discovery wells

COLORADO

LaPlata County: Conley Cox 1-A Kroeger, NW NW 35-33n-12w. IPP 38 BOPD, Dakota discovery, new field. TD 3,633 ft. Dakota.

Morgan County: Exeter Drilling Co. et al. 1 Bruchez, C NE NW 17-4n-58w. IPP 60 BOPD, and 16% water, "D" sand discovery, new field. TD 5,951 ft. J sand.

Washington County: Vaughey & Vaughey 1 State, SW SE NW 16-1s-55w. IPP 132½ BOPD, "J" sand discovery, new field. TD 5,030 ft. "J" sand.

NORTHWEST NEW MEXICO

Rio Arriba County: Pacific Northwest Pipeline Co. 33-17 San Juan Unit 28-5, NW SW 17-28n-5w. IPF 6,187 M.c.f.d. Dakota; IPF 4,761 M.c.f.d. Mesaverde. TD 8,174 ft. Dakota discovery, new gas pool.

El Paso Natural Gas Co. 32 Federal "E," NE NW 32-26n-2w. IPF 2,237 M.c.f.d., Pictured Cliffs discovery, new pool. TD 3,966 ft. Pictured Cliffs.

Sandoval County: J. I. Harvey 1 Harvey, NW SE 21-18n-3w. IPP 41 BOPD, Mesaverde discovery, new field. TD 918 ft. Mesaverde.

San Juan County: Benson-Montin-Greer 1 Bayview-Riddle, NE NE 18-27n-12w. IPF 1,235 M.c.f.d. Dakota discovery, new pool. TD 6,032 ft. Dakota.

Redfern & Herd 2 Phillips, SE SE 22-28n-11w. IPF 8,429 M.c.f.d., Dakota discovery new pool. TD 6,236 ft. Dakota.

UTAH

San Juan County: British-American Oil Producing Co.-Carter Oil Co. 1 Government-Norwood, C NW NW 15-40s-22e. IPP 100 BOPD, 280 BWPD, Bluff discovery, new field. TD 5,884 ft. Desert Creek.

NEBRASKA

Banner County: Nebraska Drillers et al. 1-B Olson, C SW NW 17-18n-56w. IPP 178 BOPD, "D" sand oil discovery, new field. TD 6,542 ft.

Hitchcock County: Skelly Oil Co. 1 Frakes, SE SW NW 23-1n-32w. IPP 184 BOPD, Lansing-Kansas City discovery, new field. TD 4,401 ft.

Kimball County: Chandler & Simpson 1 Bergquist, C NW SW 29-13n-57w. IPP 210 BOPD, "J" sand discovery, new field. TD 7,181 ft. Skull Creek.

WYOMING

Johnson County: Sohio Petroleum Co. 1 Government-Moore, NE NE 27-41n-81w. IPP 105 BOPD, Tensleep discovery, new field. TD 2,326 ft. Tensleep.

Sublette County: Carter Oil Co. 1 Unit, SW NE SW 15-27n-112w. IPF 18,000 M.c.f.d., Second Frontier discovery, new field. TD 8,110 ft. Third Frontier.

SOUTH DAKOTA

Harding County: Shell Oil Co. 1 Tilus, C SW NW 11-20n-4e. IPP 111 BOPD, Red River discovery, new field. 109 BWPD. TD 8,380 ft. Red River.

KENTUCKY

Henderson County: Hupp Oil Co. and Ashland 1 M. D. Chandler, 21-P-24. IP 55 BOPD, 100 BWPD, Cypress 2,081-86 ft. TD 2,470 ft. Discovery of East Anthuston.

ARAMCO President T. C. Barger, left, discusses operations of company's 'Ain Dar gas-injection plant with Shaikh Abdullah H. Tariki, director general of Petroleum and Mineral Affairs for Saudi Arabia.

Desert Veteran Heads Aramco

- Tom Barger's temporary job has now kept him in Saudi Arabia 22 years. It's paid off, too. He's now the boss.

THE OIL business has changed the best-laid plans of a lot of people and sent many off in directions they never meant to go, but few can match the switch in signals experienced by tall, genial Thomas C. Barger.

Minnesota-born and educated as a mining engineer, Barger earned a letter playing ice hockey in college. He hasn't been on ice, or even near it, for years. He may have dreamed a bit about its coolness in the last 22 years, but what would be more natural to a man who has spent that much time in in the arid deserts of Saudi Arabia?

After a promising start on a mining career in the Upper Midwest of the U. S. and in the Northwest Territories of Canada, Tom Barger went to work for Standard Oil of California in 1937 as a geologist on an assignment in Saudi Arabia. He was told at the time that this new Arabian venture didn't look too promising and he'd probably wind up in Indonesia.

That was 22 years ago. Two months ago, Tom Barger became president of Aramco without ever leaving that "not-too-promising" first assignment in Saudi Arabia.

Discovery anchors him . . . In his younger days, Barger would have been the first to scoff at any prediction that he'd spend his professional career in the desert.

Born in Minneapolis, August 30, 1909, Barger attended grammar and high school in Linton, N. D., and later attended St. Mary's College at nearby Winona, Minn. He was graduated in 1931 from the University of North Dakota with a bachelor of science in mining and metallurgy.

After college, Barger moved in almost the opposite direction of his ultimate destination. His first job was as a miner-surveyor with Lake Shore Mines, Ltd., at Kirkland Lake, Ont. Three years later he spent a year with Bear Exploration & Radium Co., Ltd., at Great Bear Lake, Northwest Territories, as mining engineer and assistant manager of the operation. Then he returned to his alma mater for 2 years as an associate professor of mining and metallurgy.

The year 1937 proved to be the turning point, both geographically and from the standpoint of his career.

When he went to work for California Standard, his employer told him the job in Saudi Arabia wouldn't be a bed of roses, but it probably wouldn't last long anyway. He was told his new job was "50% getting along with our partners; 40% surviving in the environment; and only 10% professional."

Then in March, 1938, the Saudi Arabian discovery was made at Dammam and Barger's fate was sealed.

He learns Arabic . . . His first assignment was a 4-month exploration trip into the vast Rub-al-Khali, the Arabian Peninsula's "Empty Quarter" with no companions except Bedouin guides. This meant exploring areas of Saudi Arabia that no westerner ever

▶▶▶ Personals

Ed Rich, driller with Big Chief Drilling Co., has been promoted to tool pusher.

A. E. Johnson, Sunray Mid-Continent Oil Co. area superintendent in Perryton, Tex., has been transferred to Wichita as field superintendent.

Donald L. Rundle, assistant gas analyst for Sinclair Oil & Gas Co. at Seminole, Okla., has been promoted to gas analyst at the company's Eldorado, Tex., gas-products plant.

C. N. Hunt, Jr., assistant superintendent in Liberty, Tex., for Humble Oil & Refining Co., has been named operations superintendent in Ganado, Tex.

H. F. Mason has been appointed group supervisor in process development at California Research Corp.'s Richmond, Calif., laboratory. **W. D. Rosenfeld** has been named senior research biochemist at the company's La Habra, Calif., laboratory. Also at La Habra, **John H. Spotts** has been named research geologist, and **John R. Milne** has been named research engineer in producing research.

Grant H. Young, manager of Ohio Oil Co.'s marketing development division, has been appointed assistant manager of marketing.

John W. Herron, tool pusher with S. W. Jack Drilling Co. in Avonmore, Pa., has joined Fox Rotary Drilling Corp. in Washington, Pa., as tool pusher.

J. J. Hohler, marine division exploration manager for Shell Oil Co., has been named manager of Houston division exploration. He succeeds **W. R. Cobb,** who has been given a 6-month assignment in The Hague.

saw before. It also started Barger on the road to Aramco's presidency.

As he recalls it now, he had a copy of "Spoken Arabic of Mesopotamia" in his hands most of the time. This is a far cry from today when any new Aramco employe can get a thorough indoctrination in spoken Arabic and can become well versed in the language if he takes advantage of the instruction offered by the company.

Barger learned his Arabic in those early days the hard way. In addition to his volume of Mesopotamian Arabic, he learned the colloquial dialects of the desert. He compiled a description of the desert's flora and fauna with the proper Arabic names for the plant life.

Today Tom Barger speaks modestly and almost disparagingly of his Arabic, one of the world's most difficult languages for a westerner to master. But, his colleagues in Aramco consider him a practical Arabist. He admits only that he speaks Arabic and has an "elementary" knowledge of reading and writing.

The slender geologist had a sensitivity for Arab feeling from the first and a profound respect for the Arab culture and way of life. It was this interest in the people and the area in which he worked that brought the next switch in his career.

A desert hunter . . . After 4 years as a geologist in those early exploration days, Barger's growing knowledge of the Arabs and the country pegged him for a more valuable job for his company as director of local government relations.

From this he moved into the job as Aramco's representative to the Saudi Arab Government. This was the job he held in January, 1958 when he became a vice president of the company and assistant to Norman Hardy, the president who is now chairman. In October he was elected to Aramco's board.

Norman H. Pederson, supervisor at Union Oil Co.'s Santa Maria refinery, Arroyo Grande, Calif., has been named supervisor of catalytic cracking at the Los Angeles refinery, Wilmington, Calif.

Frederick J. Toth, Denver production division manager for Shell Oil Co., has been appointed area production superintendent in New Orleans. Toth was division superintendent in Bakersfield, Calif., and Casper, Wyo., division production manager for Shell before moving to Denver.

Rex C. Cabaniss, Shell Oil Co. district exploitation engineer, has been transferred to Midland, Tex., from Roswell, N. M.

Don E. Keller, Jr., production foreman with Ohio Oil Co., has been transferred to Bay City, Tex., from Hobbs, N. M.

O. E. Young, assistant chief civil engineer for Humble Oil & Refining Co., has retired. A graduate of Alabama Polytechnic Institute (Auburn), Young joined Humble in 1922.

Herman F. Mark, director of the Polymer Research Institute of Polytechnic Institute of Brooklyn and consultant with several oil firms, has been elected a director of Western Petrochemical Corp.

P. O. Hull, Olney, Ill., superintendent for Pure Transportation Co., has been promoted to manager of the crude-oil purchasing department of Pure Oil Co. in Houston. **Jim Ogdon,** formerly in Van, Tex., will succeed Hull in Olney.

Jesse A. True, president of Sterling Oil of Oklahoma, Inc., has been elected president of Australia-American Oil Co., Pty., Ltd., Tulsa, newly acquired subsidiary of Sterling Oil. With the recent purchase of Australian-American. Sterling Oil now holds exploration rights on 12 million acres in the Great Artesian basin of Australia.

A. M. Alloway, executive vice president of Anschutz Oil Co., Inc., Denver, has been elected president and a director of Anschutz Drilling Co. He succeeds **Fred B. Anschutz,** who is now chairman. Alloway also will become treasurer and general manager of the drilling company. **H. O. Lynch,** Denver, has been named a vice president of Anschutz, and **Mark Adams,** Wichita, has been named a director. **Marcel Learned,** a director, has been elected secretary. He succeeds **J. H. Cazier,** who continues as a vice president.

E. H. Oliver and **J. H. McCulley** have been named general foremen in the process division at Humble Oil & Refining Co.'s Baytown, Tex., refinery. Oliver has been given a rotational assignment as assistant process superintendent and McCulley has been assigned to the distillation department. **W. K. Roquemore** and **J. R. Lander** have been named assistant general foremen in the process division, assigned to the cracking and polymerization department.

▶▶▶ Personals

J. L. Flinn, Monterey Oil Co. engineer, has been transferred to Midland, Tex., from Long Beach, Calif.

M. J. Chisholm, Jr., assistant division manager in Tampa, Fla., for Phillips Petroleum Co., has been transferred to the Houston sales division as assistant manager.

Harris T. Dodge, vice president in charge of foreign operations, Western Hemisphere and West Africa, for Texaco, Inc., has been promoted to senior vice president in charge of worldwide sales. **Landon B. Derby,**

DODGE

DERBY

general manager of foreign operations since 1957, will succeed Dodge as vice president, Western Hemisphere and West Africa. Dodge has been with Texaco since 1920. Derby joined the company in 1927.

William B. Read, assistant supervisor of Ohio Oil Co.'s oil-movements department, has been named supervisor of the Findlay, Ohio, engineering department. **William T. Goddard** succeeds Read.

Charles I. Poole, formerly division distribution engineer for Pioneer Natural Gas Co., has opened consulting offices in Lubbock, Tex. He will specialize in natural-gas engineering. Poole had been with Pioneer Natural since 1948.

F. Allen Calvert, Jr., president of Calvert Drilling, Inc., has been named chairman of a special committee set up by Independent Petroleum Association of America to study legislation aimed at solving the problem of federal regulation of natural-gas producers. **Jack O. McCall,** president of Louisiana Land & Exploration Co., is vice chairman. Committee members are **John F. Lynch,** La Gloria Oil & Gas Co.; **John M. Kelly,** Elk Oil Co.; **Elliott G. Flowers,** Union Oil & Gas Corp.; **Warren H. Kraft,** Honolulu Oil Corp.; **Eugene T. Adair,** Texas Pacific Coal & Oil Co.; **C. D. Miller,** Republic Natural Gas Co.; and **R. C. Kay,** Amarillo, Tex.

▶▶▶ Personals

W. B. Golush, formerly manager of the New York gas department of Shell Oil Co., has been named general gas manager for the company in a reorganization of head office gas-gasoline activities. **J. T. Jordan,** manager of the head office technological department, has been named manager, gas engineering, in the gas department. **M. L. Newmaster,** formerly superintendent of Shell's TXL gasoline plant in West Texas, will be senior gas engineer in a gas utilization group. Golush will have responsibility for coordination of Shell's natural gas-gasoline activities, including dealings with FPC.

GOLUSH

A. E. Piper has been named Alberta district engineer in Pan American Petroleum Corp.'s Canadian division.

Four Stone & Webster Engineering Corp. managers have been elected vice presidents of the company. They are **Harold F. Cleary** and **Donald N. McCord,** construction managers; **M. H. Cutler,** engineer manager; and **William R. Prang,** West Coast district manager.

Donald B. Edwards has resigned as sales superintendent for Pan American Petroleum Corp. to open consulting offices in Tulsa. He will specialize in natural gas and natural gas liquids problems and development. Edwards had been with Pan Am since 1946 and was with Continental Oil Co. before that time. He is currently a vice president and director of Natural Gasoline Association of America. He is a graduate of Rice Institute and the Harvard Graduate School of Business Administration.

E. K. Dodson, Cosden Petroleum Corp.'s vice president in charge of exploration, will head the company's new Midland, Tex., exploration office. Cosden's exploration department moved to Midland from headquarters in Big Spring, Tex., last week. **Harry S. Lain,** chief geologist, and **Warren A. Wilson,** chief geophysicist, will also headquarter in Midland.

H. M. Saxon, area manager in Newark, Ohio, for Pure Oil Co., has been named division manager in Olney, Ill. He succeeds **M. H. Plummer,** who has retired.

Mike E. Harrell, exploration engineering trainee with Shell Oil Co., has been named production engineer in Roswell, N. M.

E. J. McLain, manager of the land department for Shell Oil Co. in New Orleans, has been named assistant to the vice president. **E. C. Abell,** area land agent, will succeed McLain.

T. S. Nickell, superintendent of construction for Wilcox Oil Co. in Stroud, Okla., has been named gas-system operator in Perry, Okla.

Charles A. Cogan, assistant manager of the Casper, Wyo., refinery of Standard Oil Co. (Ind.), has been appointed assistant manager of the operations division, manufacturing department. He will headquarter in Chicago.

L. F. (King) Kohle, superintendent for E. L. Doheny, Operator, Beverly Hills, Calif., has retired after 34 years with the Doheny companies. Kohle will open consulting offices in Santa Paula, Calif., specializing in workover and completion jobs.

Theodore R. Keprta, junior petroleum engineer in Houston for Sinclair Oil & Gas Co., has been promoted to intermediate petroleum engineer there. **Harold G. Shapiro,** junior petroleum engineer, has been transferred to Gladewater, Tex., from Gainesville, Tex.

Lincoln B. Crosby, manager of Monsanto Chemical Co.'s Springfield, Mass., plastics division plant, has been promoted to director of manufacturing, eastern operations, for the plastics division. **Allen G. Erdman,** division administrator for vinyl products, has been appointed plant manager in Springfield.

F. D. Dennstedt, head of the technical division at Esso Standard Oil Co.'s Baton Rouge refinery, has been appointed assistant general manager there. **R. A. Winslow,** head of the refinery's mechanical division, has been named operating superintendent. In other appointments at Baton Rouge, **O. R. Menton,** head of crude and product coordination, succeeds Dennstedt; **T. J. Innes,** assistant head of the chemical products division, succeeds Winslow; and **Randall Meyer,** assistant head, mechanical division, succeeds Menton.

A. H. Crookston, engineering trainee with Continental Oil Co., has been promoted to associate engineer in Linch, Wyo.

D. R. Hieger, engineer in Corpus Christi, Tex., for Sunray Mid-Continent Oil Co., has been promoted to reservoir engineer and transferred to Houston.

Malcolm P. Hanson, secondary-recovery engineer for Standard Oil Co. of California in La Habra, Calif., has been named development engineer in Oxnard, Calif.

Robert H. Stebbins has joined Hunting Geophysical Services, Inc., New York, as chief geologist. He will be in charge of developing activities in the U. S. and Mexico.

Eugene Hosford, Fort Worth division production coordinator for Gulf Oil Corp., has been named operations coordinator for domestic production. He will headquarter in Houston. Hosford succeeds **N. C. Simpson,** who recently was elected an administrative vice president and coordinator. Hosford joined Gulf in 1935. He has been assistant manager of production in Tulsa and Fort Worth and was Roswell, N. M., district manager before moving to Fort Worth last year. He is a graduate of the University of Oklahoma.

HOSFORD

H. M. McNeely, Jr., contract sales representative in Fort Worth for Continental Oil Co., has been promoted to manager of marketing for Conoco's Corpus Christi, Tex., district. He succeeds **B. J. New,** who recently was appointed commission agent in Victoria, Tex.

Donald L. Horton, formerly with Pan American Petroleum Corp., has been named production engineer in Wichita for Northern Natural Gas Producing Co. He will be in charge of engineering for drilling and production activity in Kansas and the Oklahoma and Texas panhandles.

James C. Conner, formerly division gas superintendent in Fort Worth for Pan American Petroleum Corp., has been transferred to Standard Oil Co. (Ind.), the parent company, as administrative assistant to the chairman of the board. He will specialize in natural-gas regulation problems.

F. H. Warren, formerly manager of Ohio Oil Co.'s supply and transportation planning department, and **N. E. Trumbull,** formerly assistant manager of the Casper, Wyo., production di-

WARREN

TRUMBULL

vision, have been named senior planning associates for the company. Warren joined Illinois Pipe Line Co., Ohio Oil subsidiary, in 1939. He is a graduate of Iowa State University. Trumbull joined the company in 1936 after graduation from Colorado School of Mines.

J. N. Burkhalter has joined Pan American Petroleum Corp. as engineer trainee, production, in Riverton, Wyo.

Ralph L. Trimble, district petroleum engineer for Ohio Oil Co. in Robinson, Ill., has been named petroleum engineer for Oasis Oil Co., Ohio subsidiary, in Tripoli, Libya.

F. E. Griffin, executive vice president of Lago Oil & Transport Co., Ltd., Aruba, Netherlands Antilles, has been named a director of Iranian Oil Refining Co., N.V., and general manager of the Abadan refinery. The appointment is effective September 1.

Roger M. Wright, geologist assigned to a Standard Oil Co. of Texas seismograph crew, has been promoted to geophysical analyst in Houston.

J. E. Lawson has been named supervising engineer in the technical division at Humble Oil & Refining Co.'s Baytown, Tex., refinery. He will be in charge of the distillation section.

Russell Lilly, district superintendent for Humble Oil & Refining Co. in Farmington, N. M., has been named operations superintendent in Hobbs, N. M., in a move of production office headquarters.

Charlie T. Chapman, tool pusher with J. D. Sprecher, Casper, Wyo., drilling contractor, has been transferred to Powder Wash, Colo., from Rawlins, Wyo.

Leslie D. Sellers, Sinclair Oil & Gas Co. district production foreman in Covington, Okla., and **Jess J. Heiskell,** Drumright, Okla., district production foreman, have exchanged jobs. **Robert E. Warren,** pumper in Sedan, Kans., has been promoted to assistant district production foreman in Lindsay, Okla.

Charles C. Marietta, formerly design engineer with Venezuelan Atlantic Refining Co., has joined Pipe Line Technologists, Inc., Houston, as special representative in Mexico. He will headquarter in Mexico City. Marietta had been with Venezuelan Atlantic for 19 years. He entered the oil business in 1927 with Venezuelan Gulf Oil Co.

▶▶▶ Personals

Robert E. Lampkin has been named general manager of Petroleum Technologists, Inc., and technical advisor for the company's domestic and foreign operations. He will headquarter in Dallas. Lampkin had been manager of the company's Pacific Coast and offshore laboratories in Montebello, Calif., for the past year.

LAMPKIN

He will be succeeded there by **Peter T. Schuyler.** In other appointments, **Joseph B. Bearden,** laboratory technician, has been promoted to supervisor of the Santa Barbara, Calif., offshore laboratories. **James P. Bliss,** formerly with Gulf Oil Corp., in Fort Worth, has been named senior laboratory technologist at Montebello.

Ed Clay, petroleum engineer with Pure Oil Co., has been transferred to Worland, Wyo., from Olney, Ill.

John Strecker, formerly with Tidewater Oil Co. in Casper, Wyo., has joined Malco Refineries, Inc., in Denver as geologist.

William G. Swartz, Jr., manager of operations and manufacturing for Cities Service Oil Co. (Pa.), has been elected a vice president. Swartz joined Cities Service in 1947 as a junior engineer. He is a graduate of the University of Oklahoma.

▶▶▶ Deaths

Gilbert F. Frick, 61, senior drilling superintendent with General Petroleum Corp., was killed July 25 in the crash of a company-chartered helicopter near Lake Becharof on the Alaskan peninsula. Frick was in charge of a GP wildcat currently drilling in the Lake Becharof area. He had been with the company since 1922. Three other men escaped the crash with minor injuries. They were **Robert D. Townsend, Jr.,** General Petroleum project engineer; **Bruce Deters,** Johnson Testers; and **Robert Austin,** pilot.

Clarence Mark Fuller, 71, vice president of Engine Life Products Corp., died July 22 at his home in Whittier, Calif. Fuller was at one time president of Richfield Oil Co., a predecessor of Richfield Oil Corp. He headed C. M. Fuller Co., engine oil-filter firm, until it was merged with Engine Life Products several years ago. His son, Winston R. Fuller, is president of Engine Life.

Charles L. McAnallen, 83, retired drilling contractor, died July 26 in his Tulsa home after a heart attack. McAnallen was an independent contractor before joining Mac Stauffer Drilling Co. He retired from this company in 1942.

Henry W. Pratt, 61, sales engineer in American Oil Co.'s Boston sales district, died July 21 in Buffalo, N. Y., after a heart attack. Pratt joined Amoco in 1924. He was branch manager in Buffalo before moving to Boston earlier this year.

James M. Bugbee, 57, senior mud engineer in Shell Development Co.'s exploration and production research division, died July 22 in a Houston hospital after a brief illness. A graduate of Stanford University, Bugbee was with Baroid division of National Lead Co. and Standard Oil Co. of California before joining Shell in 1944. He was active in industry affairs and was a guiding spirit in the southern district API study committee on drilling fluids. He had been senior mud engineer for Shell since 1950.

Cal Bedeaux, 49, division landman and an assistant secretary of Forest Oil Corp., died July 17 in his Denver home. Bedeaux joined Forest in 1927 in Bradford, Pa.

Let demand gage distillate stocks

BY JOHN C. CASPER

IT'S TOO LATE to do much about correcting gasoline inventories for this driving season, but refiners do have time to adjust distillate stocks to bring the total in line with demand expected this winter.

Gasoline markets are improving. Prices will be higher in August than they were in June and early July.

But even normal prices for the remainder of the year would not recover the loss from low prices this summer. There is no general agreement on just how low gasoline prices have been, but reports from marketers show that the average has been at least half a cent under what could be called normal for the summer.

The price drop may have been more than half a cent, but even at this rate refiners chopped better than 50 million dollars off total income for June and July.

Here are the figures. Total gasoline demand averaged 4,350,000 bbl. daily in June and is expected to be about 4,450,000 bbl. daily for July. At these rates, total gasoline sales for the two months will amount to a little over 11¼ billion gallons.

At half a cent a gallon, the total loss would amount to over 56 million dollars. That's enough to build a 40,000-50,000 bbl.-a-day refinery.

This summer can't be classified as a good gasoline season even if the influence of refinery strikes brings higher gasoline prices in August. It's time for refiners to turn their attention to heating oils.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,859,405	DOWN	295	UP	257,890
Crude stocks	270,367,000	UP	79,000	UP	18,647,000
Completions	1,058	UP	43	UP	152
Refinery runs	8,042,000	UP	96,000	UP	525,000
Gasoline stocks	188,157,000	DOWN	1,702,000	UP	9,349,000
Kerosine stocks	28,964,000	UP	732,000	UP	3,626,000
Distillate stocks	134,463,000	UP	5,111,000	UP	18,906,000
Residual stocks	54,789,000	UP	520,000	DOWN	11,698,000
Four-product stocks	406,373,000	UP	4,661,000	UP	20,183,000
Total imports	1,224,700	DOWN	700	DOWN	69,700

Distillate stocks have been too high since the end of the first quarter. The trouble came in March when the reduction of distillate stocks was the smallest since 1948.

Also, second-quarter additions to distillate storage were second-highest in history, topped only by the abnormal gains in the period just after the reopening of Suez Canal in 1957. Total added during the quarter was 39 million barrels.

Further Gains Seen

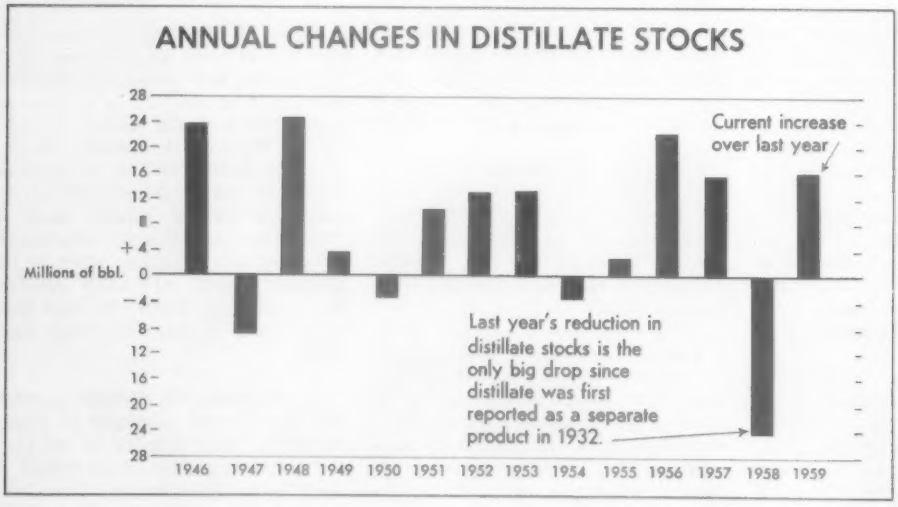
Current refinery reports point to further gains of about 18 million barrels in July. This will bring the 4-month buildup to 57 million barrels. This increase seems to be a continuation of the high-stock policy in operation since the end of World War II.

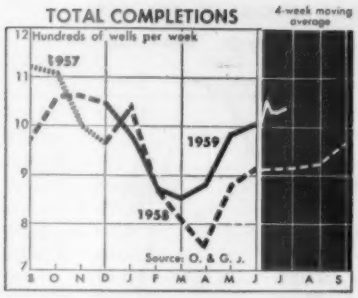
For example, distillate stocks on October 31, 1948, represented 83.8 days' supply. By October 1957, days' supply of distillate had climbed to 97.0. Stocks had gained 15.8% more than demand. For the same period, all-product stocks showed an increase of only 6.9% in terms of days' supply.

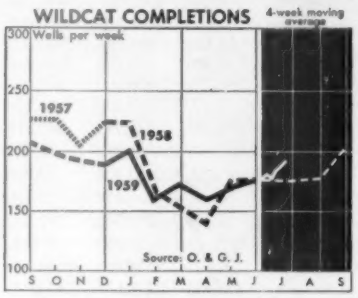
Refiners reporting to the Texas Railroad Commission last March listed desirable inventory levels for April 1 and November 1. Based on proportionate increases between these dates, distillate stocks should amount to about 118 million barrels at the end of July. The total was 129 million on July 17 and probably will rise at least another 6 million by the end of the month.

All of the surplus distillate is in the Gulf-East Coast area. On July 17, stocks in all districts represented a gain of 15.9 million barrels over last year. The Gulf-East Coast increase was 16.2 million barrels. Other districts showed a small decrease over last year's figures.

If these big gains continue until the opening of the heating season, the backlog will keep heating-oil prices under pressure at least for the first half of the season.







Active Rotary Rigs

	7-27-59	7-20-59	7-28-58
Alabama	9	9	6
Arkansas	15	16	16
Arizona	1	1	0
California	88	96	77
Land	83	91	(*)
Offshore	5	5	(*)
Colorado	57	50	51
Florida	1	1	0
Land	0	0	0
Offshore	1	1	0
Georgia	0	0	1
Illinois	38	41	33
Indiana	6	8	5
Iowa	2	2	3
Kansas	140	140	131
Kentucky	4	5	6
Louisiana	364	376	290
North	45	43	44
S. Inland waters	144	153	(†)
S. Land	120	121	207
Offshore	55	59	39
Maryland	0	0	0
Michigan	26	28	9
Mississippi	65	71	36
Missouri	1	1	1
Montana	27	24	21
Nebraska	27	24	24
Nevada	1	0	0
New Mexico	110	94	104
New York	1	1	2
North Dakota	31	28	32
Ohio	5	5	0
Oklahoma	236	247	184
Oregon	0	0	1
Pennsylvania	9	11	10
South Dakota	3	2	0
Texas	767	776	608
S. Inland waters	10	9	(†)
S. Land	198	191	136
Offshore	0	0	1
North-East	150	154	(*)
West Central	265	271	(*)
West	144	151	(*)
Utah	33	30	33
Washington	1	1	0
West Virginia	11	10	4
Wyoming	87	98	60
Total U. S.	2,166	2,196	1,748
Western Canada	145	157	153
Eastern Canada	0	0	2
Grand Total	2,311	2,353	1,903

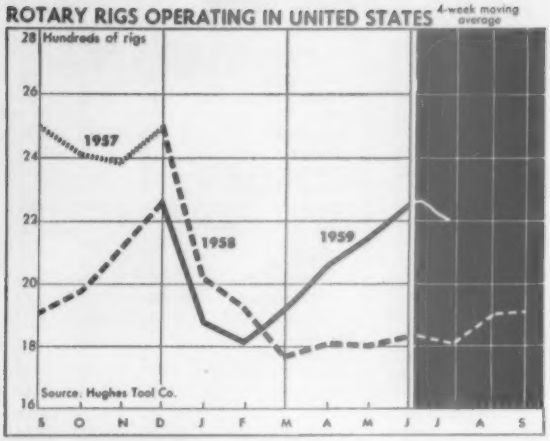
Hughes Tool Co. report. *Comparisons not available due to change in method of reporting. †Included in South-Land.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JULY 25, 1959

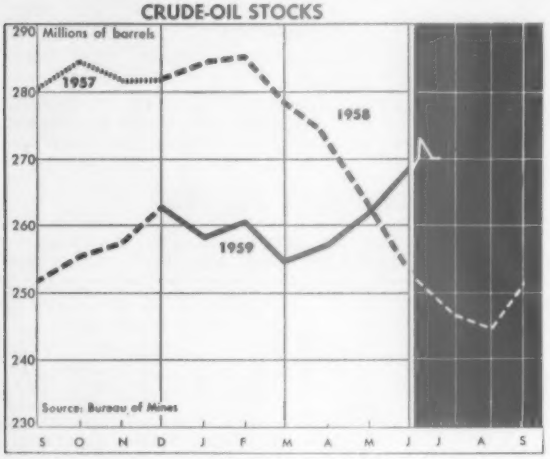
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1959	1958	Total	Crude	Cond.	Gas	Dry	1959	1958
Alabama	1	0	0	0	1	0	5,626	55	42	1	0	0	0	1	12	16
Arkansas	26	13	0	3	10	0	73,157	483	380	7	1	0	1	5	84	96
California	20	8	0	1	7	4	112,164	844	958	4	0	0	0	4	202	211
Colorado	25	3	0	2	20	0	128,299	421	430	17	1	0	0	16	249	241
Illinois	72	34	0	0	25	13	165,513	1,209	1,159	11	5	0	0	6	194	230
Indiana	20	6	0	1	13	0	27,312	451	416	8	0	0	0	8	151	151
Kansas	89	43	0	8	36	2	330,400	2,222	2,108	19	0	0	4	15	506	445
Kentucky	57	27	0	1	25	4	46,306	1,407	599	12	2	0	1	9	99	65
Louisiana	76	32	11	3	30	0	645,901	2,000	1,886	15	2	2	0	11	258	264
North	29	14	0	3	12	0	100,763	719	666	4	1	0	0	3	100	93
South	40	15	10	0	15	0	467,798	1,061	968	10	1	2	0	7	148	155
Offshore	7	3	1	0	3	0	77,340	220	252	1	0	0	0	1	10	16
Michigan	9	6	0	0	3	0	23,774	335	237	3	0	0	0	3	82	78
Mississippi	12	3	1	0	8	0	125,635	351	222	6	0	0	0	6	166	108
Montana	8	3	0	0	5	0	31,540	175	192	1	0	0	0	1	57	85
Nebraska	18	8	0	0	10	0	107,644	470	387	7	1	0	0	6	197	182
New Mexico	55	35	0	7	13	0	243,702	1,082	1,099	7	0	0	0	7	128	147
West	20	11	0	6	3	0	55,918	489	525	2	0	0	0	2	39	62
East	35	24	0	1	10	0	187,784	593	574	5	0	0	0	5	89	85
New York	0	0	0	0	0	0	0	149	325	0	0	0	0	0	13	32
North Dakota	11	7	0	0	4	0	77,788	294	249	1	0	0	0	1	58	84
Ohio	26	11	0	5	6	4	71,601	553	589	1	0	0	0	1	15	6
Oklahoma	86	50	1	8	26	1	383,147	3,298	3,669	11	1	0	1	9	478	517
Pennsylvania	0	0	0	0	0	0	0	311	310	0	0	0	0	0	5	9
Texas	401	210	14	13	155	9	1,652,398	10,814	10,163	86	4	2	0	80	2,016	2,092
Dist. 1	18	4	1	2	11	0	50,647	648	552	9	0	0	0	9	181	226
Dist. 2	22	6	0	4	12	0	121,904	456	432	8	0	0	0	8	133	113
Dist. 3	36	20	1	1	14	0	150,778	661	749	3	0	0	0	3	133	163
Dist. 4	33	12	4	2	14	1	178,636	744	691	10	0	2	0	8	183	200
East	44	26	3	0	15	0	163,794	665	689	8	0	0	0	8	132	198
Dist. 7-B	62	31	0	0	28	3	144,297	1,512	1,341	11	0	0	0	11	397	375
West	102	69	0	0	33	0	538,813	3,319	2,977	26	3	0	0	23	448	422
Dist. 9	60	31	0	2	22	5	173,560	2,044	2,021	8	1	0	0	7	346	335
Dist. 10	24	11	5	2	6	0	129,969	765	711	3	0	0	0	3	63	60
Utah	8	8	0	0	0	0	46,213	185	231	1	1	0	0	0	49	44
West Virginia	10	1	0	9	0	0	33,379	416	386	2	0	0	2	0	13	11
Wyoming	27	16	0	1	10	0	136,976	520	402	7	0	0	1	6	175	117
Misc. (Iowa)	1	0	0	0	1	0	2,236	65	56	1	0	0	0	1	34	48
Total U. S.	1058	524	27	62	408	37	4,470,711	28,110	26,495	228	18	4	10	196	5,241	5,279
Previous week	1,015	478	27	73	399	38	4,129,161	.....	.....	205	18	2	3	182	.....	.....
Cum. 1959	28,110	14,318	692	2,016	10,329	755	116,025,170	.....	.....	5,241	516	76	158	4,491	.....	.....
Cum. 1958	26,495	13,063	653	1,992	10,130	657	111,015,297	.....	.....	5,279	520	88	160	4,511	.....	.....
Western Canada	35	21	0	1	13	0	183,494	1,356	1,377	7	1	0	0	6	.....	406
Ontario	0	0	0	0	0	0	0	123	.....	.....	.....	.....	.....	.....	.....	.....

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

	7-18-59	7-11-59	7-19-58
Pennsylvania	2,506	2,472	2,900
Other appalachian	1,936	2,026	1,363
Illinois, Indiana, Michigan	10,197	9,747	10,754
Nebraska and North Dakota	2,789	2,816	2,048
Kansas	10,381	10,262	9,968
Oklahoma	17,026	16,543	17,012
Arkansas	2,011	2,260	1,897
Louisiana	19,692	19,303	16,339
North	3,174	3,283	3,009
South	16,518	16,020	13,330
Mississippi, Alabama, Florida	2,609	2,528	2,166
New Mexico	8,054	7,956	6,221
Texas	117,532	117,185	103,254
East Texas	8,991	9,061	7,202
West Texas	57,157	56,994	48,857
Texas Gulf	19,722	19,475	20,192
Other Texas	31,662	31,655	27,003
Wyoming	15,946	15,475	14,605
Other Rocky Mountain	9,260	9,766	9,435
California	32,128	32,308	38,073
Foreign	†18,300	19,641	15,685
Total	270,367	270,288	251,720

*Bureau of Mines. †Includes 5,480,000 bbl. in California.

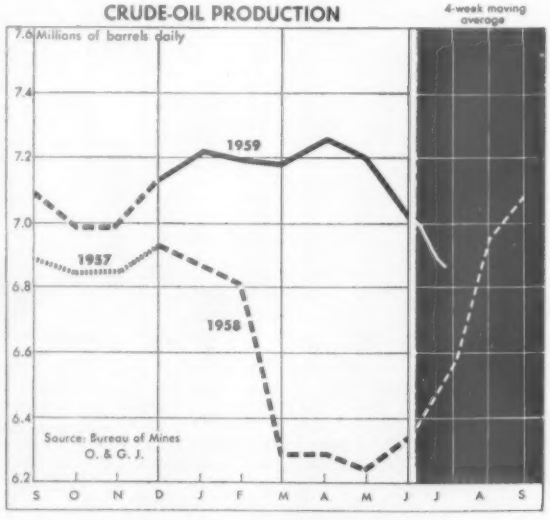
DAILY AVERAGE PRODUCTION FOR WEEK

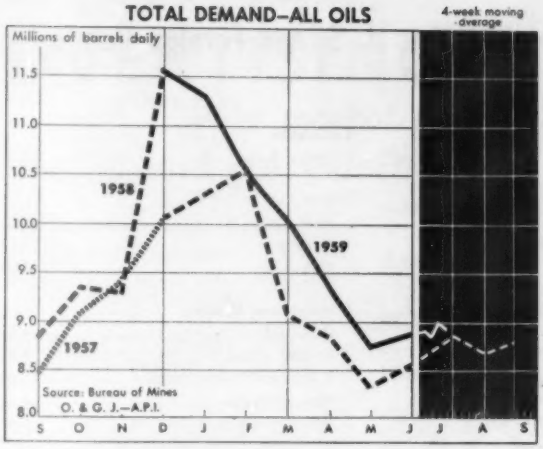
	July 25, 1959 Crude oil	Lease condensate	Total	July 18 total
Alabama	16,250	.....	16,250	16,200
Arkansas	80,950	325	81,275	81,025
California	852,200	.....	852,200	850,400
Colorado	124,000	.....	124,000	124,800
Eastern	42,600	.....	42,600	41,800
Florida	1,200	.....	1,200	1,200
Illinois	219,200	.....	219,200	213,600
Indiana	32,000	.....	32,000	31,600
Kansas	†320,145	.....	†320,145	†322,740
Kentucky	91,500	.....	91,500	86,000
Louisiana	882,700	98,500	981,200	980,900
North	110,200	5,000	115,200	114,900
South	772,500	93,500	866,000	866,000
Michigan	27,200	.....	27,200	26,600
Mississippi	127,500	4,275	131,775	131,775
Montana	81,700	.....	81,700	79,300
Nebraska	63,400	.....	63,400	62,800
Nevada	100	.....	100	100
New Mexico	288,000	3,800	291,800	291,800
North Dakota	35,200	.....	35,200	37,900
Oklahoma	†524,000	.....	†524,000	†539,700
Texas	2,407,000	71,675	2,478,675	2,478,675
Dist. 1	43,000	2,500	45,500	45,500
Dist. 2	98,000	7,900	105,900	105,900
Dist. 3	320,000	36,000	356,000	356,000
Dist. 4	167,000	8,500	175,500	175,500
Dist. 5	28,000	350	28,350	28,350
Dist. 6	101,000	6,500	107,500	107,500
East Texas field	128,000	.....	128,000	128,000
Dist. 7-B	128,000	100	128,100	128,100
Dist. 7-C	113,000	3,225	116,225	116,225
Dist. 8	970,000	3,800	973,800	973,800
Dist. 9	205,000	1,800	206,800	206,800
Dist. 10	106,000	1,000	107,000	107,000
Utah	116,300	.....	116,300	115,500
Wyoming	347,500	.....	347,500	345,100
Others	‡185	.....	‡185	‡185
Total U. S.	6,680,830	178,575	6,859,405	6,859,700
Change from prev. week, down			295	.....
Canada	†511,600	.....	†511,600	†512,700

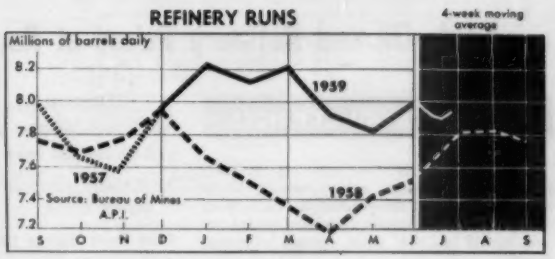
Total U. S. prod., January 1-July 25 ..... 1,470,545,025 bbl.
Same period last year (crude plus cond.) ..... *1,333,941,920 bbl.

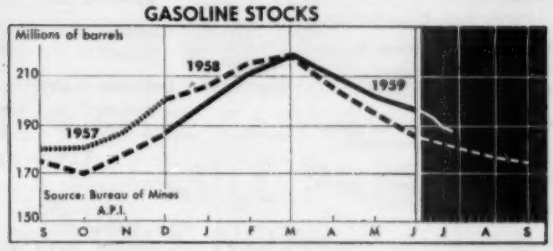
*Includes 33,457,350 bbl. condensate. †Week ended previous Monday. ‡Arizona, South Dakota, and Washington.

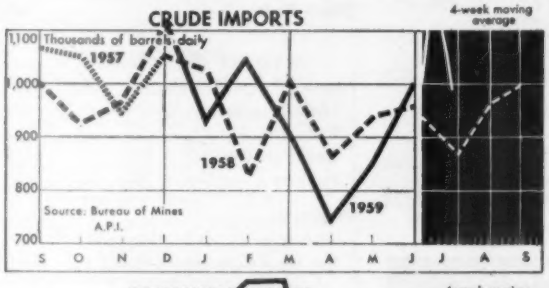
CRUDE-OIL PRODUCTION

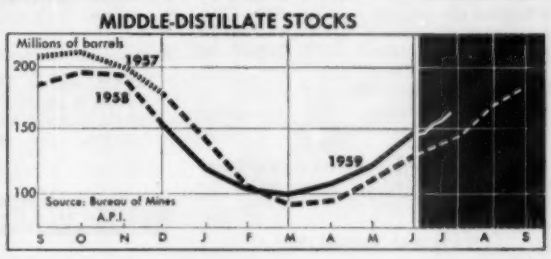


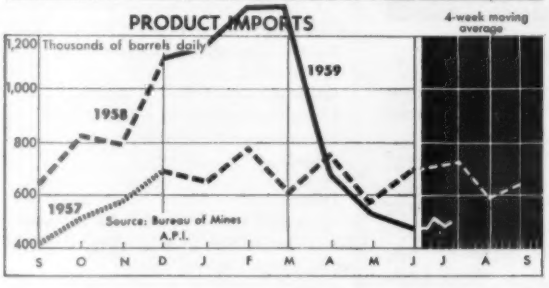


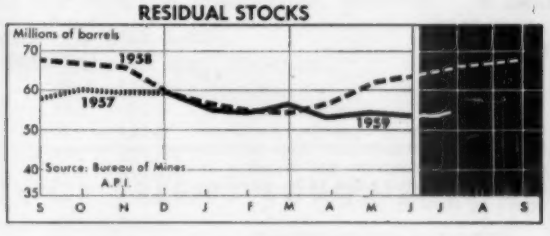












API REFINERY REPORT, JULY 24, 1959

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, July, 1958—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,092	539.9	23.9	295.2	145.4	45,265	10,564	48,221	12,047	1,093	497.0	20.1	285.4	171.9
Appalachian:														
Dist. 1	99	42.7	4.7	25.9	5.0	5,714	613	3,056	281	94	42.2	2.5	21.6	5.8
Dist. 2	109	60.9	1.7	22.0	8.3	2,817	541	1,413	172	108	55.4	5.7	17.3	7.3
Ind., Ill., Ky	1,387	719.0	67.3	262.9	131.3	32,426	6,692	22,012	4,275	1,373	718.9	60.3	265.0	124.5
Minn., Wis., Dak.	116	59.7	9.7	22.0	13.1	6,609	1,099	5,964	426	109	53.0	5.7	28.4	10.0
Okla., Kans., Mo.	700	380.3	14.3	166.9	16.9	17,590	1,432	9,206	833	742	416.4	12.5	174.9	25.5
Inland Texas	387	311.4	7.7	61.1	34.3	7,197	385	1,834	2,104	272	192.9	5.3	45.3	18.2
Texas Gulf Coast	1,788	901.4	96.1	385.0	150.9	21,931	3,756	16,556	5,181	1,633	839.3	68.4	382.6	178.6
La. Gulf Coast	750	393.6	60.4	164.1	47.4	10,729	2,350	7,132	1,685	613	362.0	38.2	149.2	45.0
N. La. and Ark.	70	30.7	1.0	16.4	4.4	4,219	757	2,355	149	100	41.7	4.3	25.5	6.6
Rocky Mountain:														
New Mexico	25	12.0	0.3	5.3	3.7	753	44	211	109	27	13.5	0.5	5.1	2.5
Other	336	149.4	5.6	65.3	42.2	5,153	350	2,756	1,108	294	134.6	3.5	61.1	30.7
West Coast	1,183	568.4	3.4	208.9	307.4	27,754	381	13,747	26,419	1,069	485.6	5.6	150.0	284.8
July 24, 1959	8,042	4,169.4	296.1	1,701.0	910.3	188,157	28,964	134,463	54,789	7,527	3,853.4	232.6	1,611.4	911.4
July 17, 1959	7,946	4,059.9	228.3	1,814.4	937.6	189,859	28,232	129,352	54,269	.....	.....	.....	.....	.....
July 25, 1958	7,517	4,066.3	230.6	1,680.0	988.4	178,808	25,338	115,557	66,487	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):

★ Regular (89 octane)	11.25-11.50
★ Premium (99 octane)	14.00-14.50

Gulf Coast (cargoes for coastwise or export movements):

Regular (90 octane)	10.75
Regular (92 octane)	11.00
Premium (98 octane)	12.125

California (rack) (Los Angeles):

★ Regular (88 octane)	12.00-12.50
★ Premium (94 octane)	13.00-13.50
★ Premium (100 octane)	14.50-15.00

Caribbean area (cargoes):

★ Regular (87 octane)	10.375
★ Premium (97 octane)	12.00

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:

Grade 26-70	4.5

Breckenridge:

Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):

Kerosine 42-44	9.25-9.75
Diesel oil (58 d.i. and above)	9.00-9.50
Distillate No. 1	9.00-9.50
Distillate No. 2	8.25-8.75

Gulf Coast (cargoes):

Kerosine 41-43	8.50-8.625
Distillate No. 2	8.125-8.25

New York Harbor (barges):

Kerosine 41-43	9.65-9.90
Distillate No. 2	9.15-9.40
Diesel fuel, 48-52 d.i.	9.30-9.55

Caribbean area (cargoes):

Distillate No. 2	8.125-8.25

WAX (LB.)

Oklahoma (Group 3):

132-135 A.m.p. (semi-refined) in tank car	6.50

New York (export):

126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):

Residual fuel (max. 1% S)	$1.85-2.00

Gulf Coast (cargoes):

Bunker C fuel	$2.00

New York Harbor (barges):

Bunker C fuel	$2.27

Caribbean (cargoes):

Bunker C	$2.00

California (rack):

Bunker C fuel, Los Angeles	$2.15

LUBRICATING OILS

Mid-Continent (Group 3):

150-160 bright stock, solvent refined, 0-10 pp., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 pp., 95 v.i.	20.5

Pennsylvania Grade:

145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	23

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	Gulf Coast Tex.*	West Tex.† N.M.	Wyo. (sour)
14-14.9	$1.86	....	....	....	....
15-15.9	1.95	....	....	....	$1.81
16-16.9	2.04	....	....	....	1.86
17.17.9	2.13	....	....	....	1.91
18-18.9	2.23	....	....	....	1.96
19-19.9	2.32	....	....	....	2.01
20-20.9	2.41	$2.49	....	$2.35	2.06
21-21.9	2.50	2.52	....	2.38	2.11
22-22.9	2.60	2.55	....	2.41	2.16
23-23.9	2.69	2.58	$3.44	2.44	2.21
24-24.9	2.78	2.61	3.46	2.47	2.26
25-25.9	2.84	2.64	3.48	2.50	2.31
26-26.9	2.90	2.67	3.50	2.53	2.36
27-27.9	2.95	2.70	3.52	2.56	2.49
28-28.9	3.01	2.73	3.54	2.59	2.54
29-29.9	3.07	2.76	3.56	2.62	2.59
30-30.9	3.12	2.79	....	2.65	2.63
31-31.9	3.20	2.82	....	2.68	2.67
32-32.9	3.27	2.85	....	2.71	2.71
33-33.9	3.34	2.88	....	2.74	2.75
34-34.9	3.41	2.91	....	2.77	2.79
35-35.9	3.47	2.94	....	2.80	2.83
36-36.9	3.52	2.97	....	2.83	2.87
37-37.9	3.56	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Low cold test crude. †Sour.

Effective dates of broad changes: California, 1-26-59; East of California, January 3-10, 1957; Pennsylvania Grade 4-1-59.

FLAT PRICES

Louisiana:

Sweet Lake	$3.00

Texas:

East Texas	3.05-3.25
Conroe	3.53
Van	3.08

Pennsylvania Grade:

Bradford	4.25
Middle District	4.07
Southwest Pennsylvania	3.80
West Virginia	3.62
Buckeye Grade	3.47

Illinois Basin 3.00

FOREIGN

Canada:

Leduc-Woodbend	2.53
Redwater (Alta.)	2.42
Smiley (Sask.)	2.18
Pembina	2.38

Venezuela:

Cumarebo, 48°-49.9°, Tucupido	3.34
San Joaquin, 41°-41.9°, Puerto La Cruz	3.08-3.10
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):

Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.86
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05

Middle East, E. Mediterranean:

Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29

Far East (cargoes, f.o.b. Lutong, Sarawak):

Seria Light, 37°	2.57

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(Latest reported spot fixtures)

Gulf-USNH, clean (ATRS—25%)	$2.14
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1958 MODEL 2000 Mayhew Drilling rig, on International tandem truck. 1959 Ford F-600 Tractor with float. Water truck. No Pipe. $32,500.00. Reply P. O. Box 755, Garland, Texas.

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or call HUdson 3-4474 or 3-4617.

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Telephone: AM 5-2611

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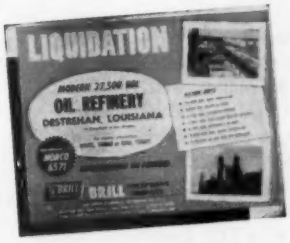

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BLENDING SUPERVISOR

Large independent petroleum refining company has opening for products blender with minimum of three to five years experience in blending full range of petroleum refinery products. Graduate Chemist or Chemical Engineer preferred.

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Continental Oil Company,
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NATIONWIDE independent oil producer wants experienced drilling mud engineer and production engineer. Send complete details, education, experience, snapshot and transcript to P. O. Box 2162, Dallas, Texas.

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SITUATION WANTED

PETROLEUM ENGINEER (Reg.) 31, 6 yrs. Diversified experience in drilling, workovers, completions, production, and reservoir, P. O. Box 8506, Houston, Texas.

PETROLEUM ENGINEER—B.S. Petroleum Engineering (Geology Option), 10 years experience including drilling, completions, waterflood, evaluations, and supervision. Capable of assembling prospects as well as doing Geological work. Desire position with aggressive independent on salary basis or retainer and interest basis. Box L-428, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: 12 years interpretive, supervisory experience through out Mid-Continent; desires position in land or geophysics. Box L-423, The Oil and Gas Journal, Tulsa, Okla.

DRILLING AND PRODUCTION supervisor or engineer. Ten years experience Offshore, South Louisiana, Canada, Rocky Mountain, Mid-Continent & Illinois Basin. Major Oil Company, Independent and Drilling Contractor. M. E. Degree. Prefer Gulf Coast and Offshore Operations. Would relocate. Resume on request. Box L-436, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GAS Engineer, desires position with future, preferably with independent or growing corporation. Experience includes Federal Regulatory Matters. Box L-440, The Oil and Gas Journal, Tulsa, Oklahoma.

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Midwest fabricators, jobbers and distributors of pipe, sheets, plates, tubing, fittings and tubular goods desire to acquire one or more corporations in related line of business for purpose of expansion. Would consider company in unfavorable current earning position or in need of financial assistance. Replies treated confidentially. **Box L-439, The Oil and Gas Journal, Tulsa, Oklahoma.**

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French distributors very well introduced in France, Germany, Africa, continual contact with Administrations, Oil Companies, Public-Works, researches new activities for account of American companies. Inquire:
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The Oil and Gas Journal,
Tulsa, Oklahoma.

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To drill proven gas-distillate wells 8,600 ft. inside locations, off-set wells dualed and tripled completions, additional tested sands behind the casing Texas Gulf Coast. Frio sand production. Complete engineering reports. Principals only. Bank references exchanged. Phone:
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HI 4-1393, Austin, Texas
OGDEN OIL COMPANY
P. O. Box 484, Taylor, Texas

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CUMBERLAND COUNTY Kentucky—200 acres near New Calloway Creek, Knox Well and other old and new production. Commercial lease, five year term. $1.00 rental, $20.00 per acre, 1/8 override. Wire, phone: Luther L. Shepherd, Burkesville, Kentucky.

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KENTUCKY—40,000 acres in Clinton, Wayne, Pulaski, Russell and McCreary Counties in blocks of 80 to 6,000 acres. Acreage adjoining, and near production. For information write P. O. Box 478, Burnside, Kentucky.

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276 acre lease fronting Caney River near Bartlesville, on structure and producing for over 30 years, ready for flooding. A good deal for qualified party. See:
H. W. DIXON, Hotel Burlingame,
Bartlesville, Aug 16-23; Thereafter,
P. O. BOX 991, Scottsdale, Arizona.

NOTICE
SALE OF OIL AND GAS MINING LEASES
TRIBAL AND ALLOTED INDIAN LANDS
Department of the Interior
Bureau of Indian Affairs
United Pueblos Indian Agency
Albuquerque, New Mexico

SEALED BIDS will be received until 2:00 P.M. Mountain Standard Time, September 10, 1959, and opened at that time in the Office of the United Pueblos Indian Agency, 1000 Indian School Road, N.W., Room 211, for the leasing of 46,830.69 acres of Tribal land and 436.53 acres of allotted Indian land, located in the following Townships and Ranges, for oil and gas mining purposes:

TOWNSHIP	RANGE
6 North	8 West, N.M.P.M.
7 North	7 West, N.M.P.M.
7 North	8 West, N.M.P.M.
8 North	7 West, N.M.P.M.
8 North	8 West, N.M.P.M.
9 North	7 West, N.M.P.M.
6 North	7 West, N.M.P.M.
8 North	6 West, N.M.P.M.
9 North	6 West, N.M.P.M.

All of the above lands are located in Valencia County, New Mexico. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the General Superintendent of the United Pueblos Indian Agency, P. O. Box 1346, Albuquerque, New Mexico.

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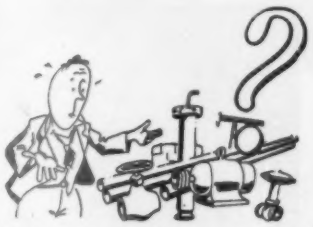

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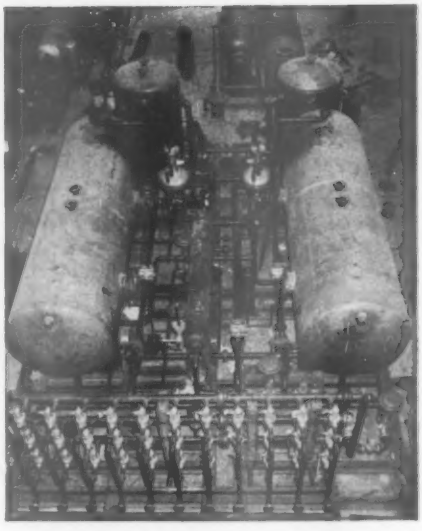

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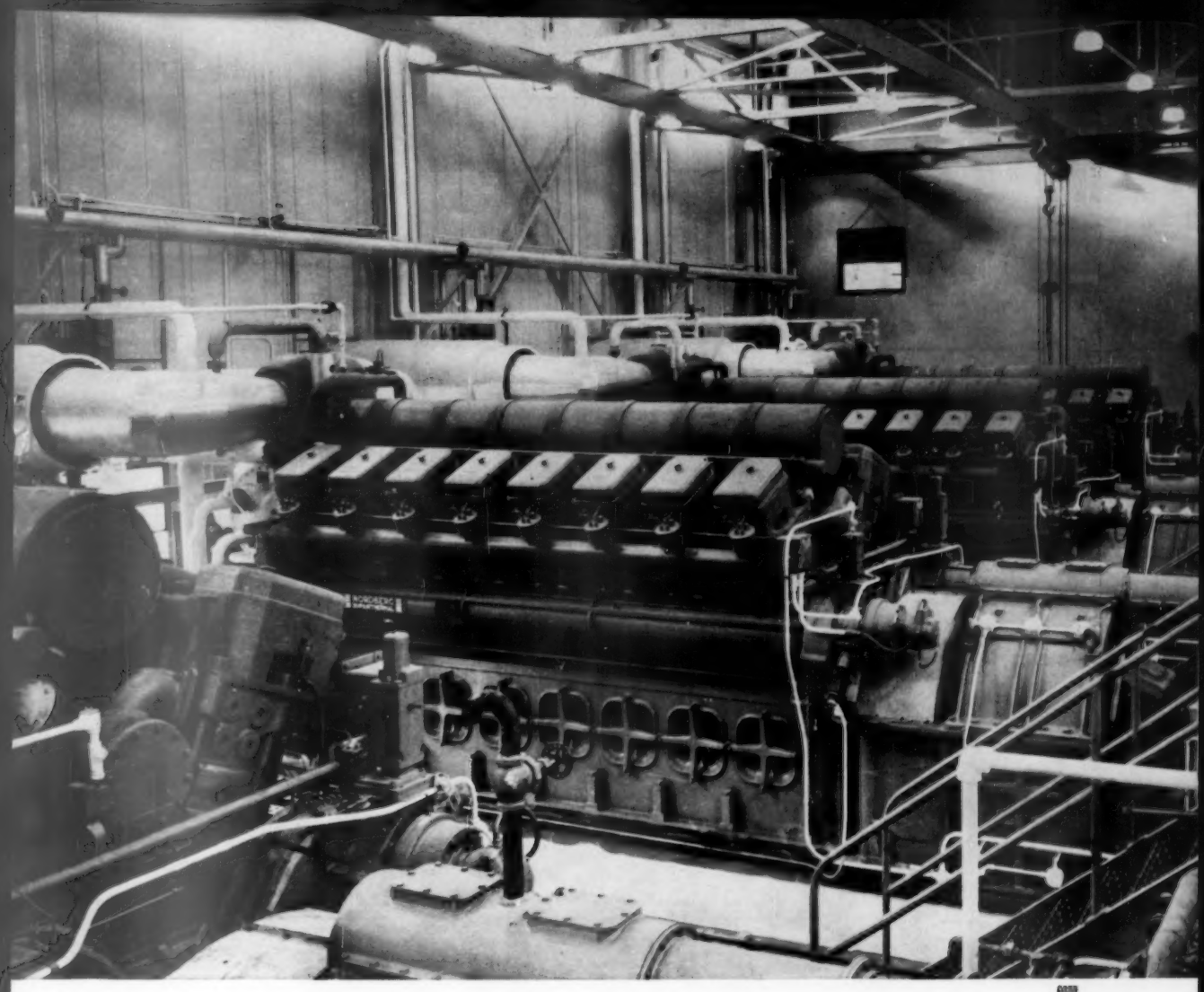

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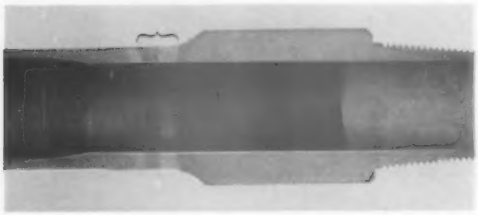

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